

PREMIERE ISSUE!

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DISK INSIDE!

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MAY 1989

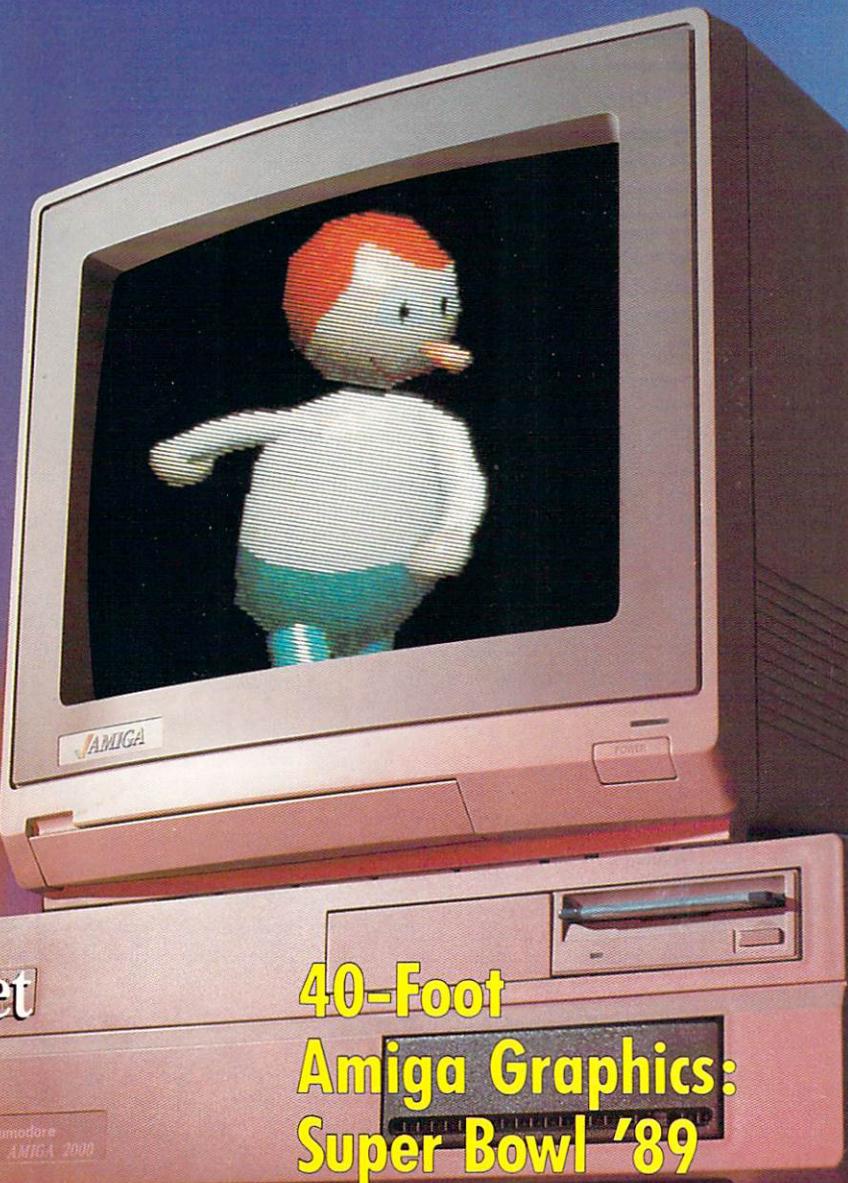
VOLUME 1,  
NUMBER 1

## DESKTOP VIDEO POWER

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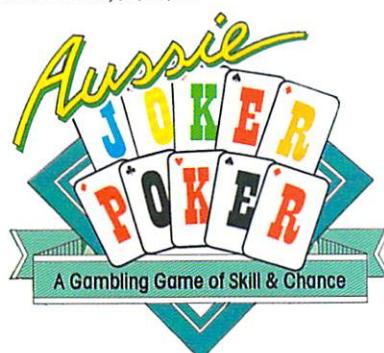
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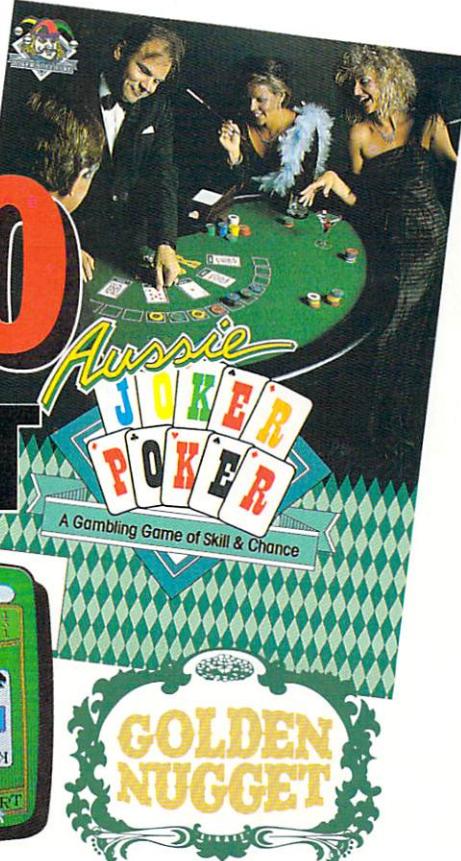
If ordering by telephone add \$3 shipping & handling and check that your PC meets the minimum hardware requirements as no cash refunds apply. Warranty is limited to free replacement of faulty products returned by prepaid post.



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### Aussie JOKER POKER Contest Rules

1. No purchase necessary to enter.
2. Void where prohibited by state or federal law.
3. To enter, simply complete and return the official entry form.
4. Limit five entries per family or household. Five free entry forms and full contest rules are included with "Aussie Joker Poker" or may be obtained by sending a stamped self-addressed envelope larger than 5½" x 7½" with a hand written request to: Aussie Joker Poker Contest Entry Forms, P.O. Box 22381, Gilroy, CA 95021-2381. Mail-in requests limited to one person, household or family and must be received no later than 3/31/89. WA & VT residents need not include return postage. Full rules also available from participating Mindscape retailers.
5. Monthly entries must be received no later than the last day of the month in which a drawing will take place in order to participate in the month's drawing. Drawings will be held from December, 1988 through April 1989, inclusive. Final entries must be received by 4/30/89.
6. Contest open to legal residents of the U.S.A. and Canada (other than Quebec).
7. Odds of winning depend on number of eligible entries received.
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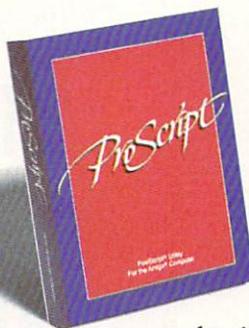
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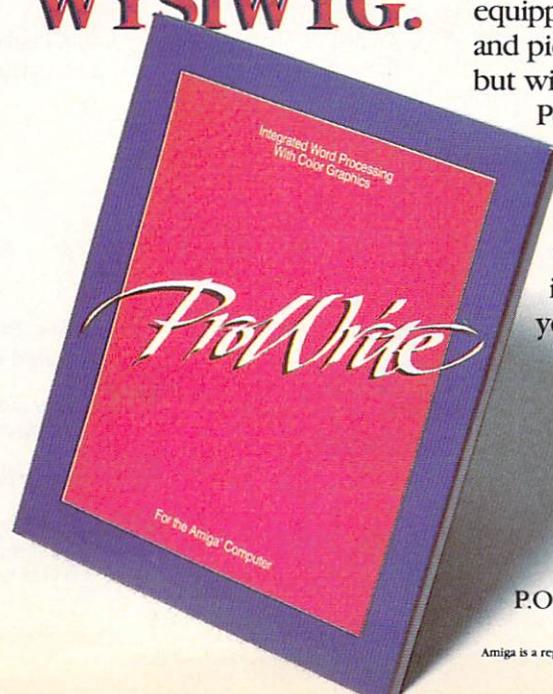
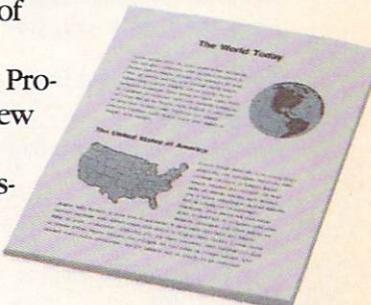
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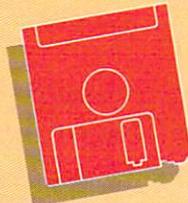
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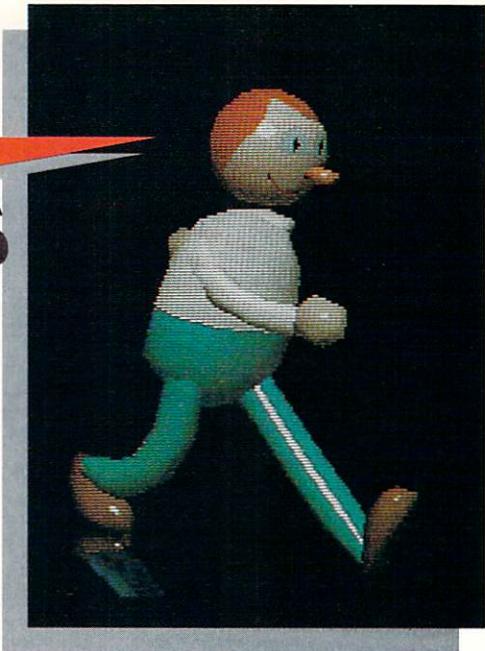
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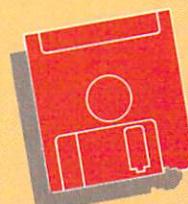
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# EDITORIAL

Hi, we're Antic's new *AMIGA Plus* Magazine with Disk. Admittedly we're a bit late coming to the banquet, but we did bring a uniquely tasty dish for you. It's the exclusive *AMIGA Plus* recipe of in-depth magazine articles and reviews, four-color illustrations on most pages—plus an optional disk packed full of professional-quality programs and video demos. There's nothing really like this in the Amiga market.

The *AMIGA Plus* format seems especially well-suited for this special computer community, where there's such great interest in using high-quality commercial software to create desktop video art. In each issue we'll publish how-to articles by top Amiga artists and give you the actual picture files on disk. For this premiere issue we present desktop video demonstrations by Hollywood animator Steve Segal, Super Bowl scoreboard artist Joel Tessler and fonts designer Lion Kuntz.

But there's much more to *AMIGA Plus* than just graphics and desktop video. You'll find plenty of valuable programming information covering C, assembler, BASIC and all levels of the Amiga operating system. Learn new programming techniques by reading the magazine articles and get the actual programming tools on disk.

Also featured in *AMIGA Plus* are timely, thorough, no-holds-barred reviews of every kind of Amiga hardware and software. This issue's reviews range from games like Star-glider II and Tetris to the Commodore 68020 accelerator board and a comparison survey of nine word processors. And thanks to an exchange agreement between *AMIGA Plus* and the renowned British magazine, *Amiga Computing*, we will be bringing you unsurpassed coverage of worldwide Amiga news.

You may never have heard of Antic Publishing Inc., the company bringing you *AMIGA Plus*. But we've published magazines for computer en-

thusiasts non-stop since 1982 and we successfully pioneered the magazine-with-disk format. Starting last year when we decided we wanted to be part of the Amiga community, we listened to hundreds of Amiga owners at stores, users groups, AmiExpos and developers conferences. You're now holding the results of this research in your hands.

We do want to continue hearing more of what you want from an Amiga magazine, so we can deliver it better. An in-depth survey will appear in the next issue and we hope you take the time to complete and mail it back to *AMIGA Plus*.

By the way, instead of just slapping the editor's picture on this first column, we wanted to show you a photo with as many as possible of the people who helped create *AMIGA Plus*. That's me in the second row, to the left of Associate Publisher John Taggart (the fellow with the Gumby on his shoulder) and green-shirted Art Director William Foster.

See you in June . . .

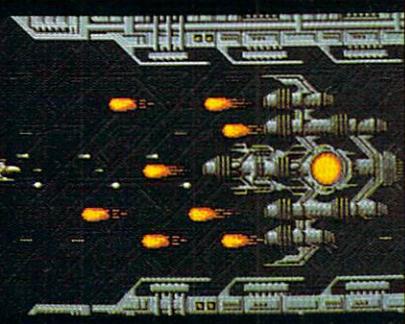
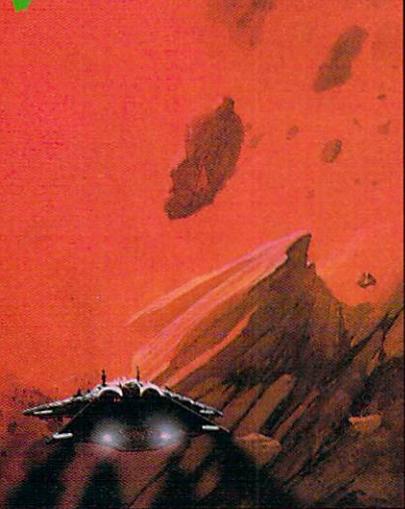
*Nat Friedland*

**Nat Friedland**  
Editor, *AMIGA Plus*



People whose names are on the masthead

# MENACE



## MENACE

This is a pure arcade game — a fast action packed journey through six very different worlds where lightning fast reflexes and furious fire button action are your only hope of survival.

Your mission orders are simple, you must destroy the planet Draconia. In theory possible, in practice . . .

The planet Draconia, an unnatural planet, has been formed over many centuries by six of the most feared rulers that have ever existed. These rulers, exiled from their home galaxy, have ravaged and plundered space, using the worlds they have destroyed and the life forms they have created to build this planet of fear and death.

Now an end must be put to their reign of terror. A large scale attack will prove too costly to our space fleets, Draconia has many orbiting defence systems, the sacrifice may be in thousands of lives. A single fighter craft, approaching undetected, may have a chance to avenge those who have perished, by destroying Draconia. You have that chance . . .

Screen Shots are from the Amiga version  
AVAILABLE NOW ON THE PSYCLAPSE LABEL

# CHRONO-QUEST



## CHRONO-QUEST

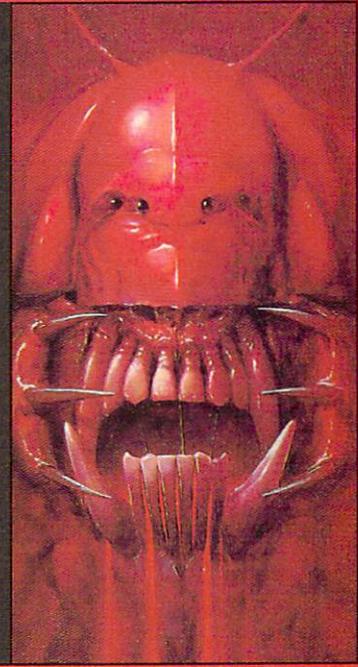
This is the first of a new generation of adventure games from Psygnosis. An adventure game in the classic sense.

Your quest begins in your father's chateau circa 1920, there you find (or should find) your father's latest invention; a fantastic time machine. Your father is dead, murdered, you are the prime suspect. A letter left by your father leads you to think the real culprit was Richard, his not so faithful servant. But he has escaped to the future using the time machine . . . who will believe your fantastic story . . . do you believe it?

You will be presented with many objectives; ultimately you will have to travel through time to collect the fragments of magnetic card to drive the Time Machine into the future. There you will have to . . . Meanwhile, the immediate objective is to find the time machine . . . Sorry, a more immediate objective is to find the room with the time machine in it. But it's dark . . . Very sorry, an even more immediate objective is to be able to see where you are going . . . 3 hours and 250 minutes and even more immediate objectives later, you are standing in the hallway thinking . . . helpppp!!!!

Screen Shots from the Atari ST version  
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# BAAL



## BAAL

\* An addictive mixture of strategy and arcade action featuring:

\* 8 way ultra-smooth scrolling through 3 distinctive domains containing multiple levels.

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His army of undead have stolen an awesome weapon of destruction, a War Machine.

As leader of the ultimate battle fighters, your quest is to invade BAAL's domain, fighting off his monstrous demonic beasts to retrieve the War Machine . . . but . . . you must kill BAAL in the process.

Can you succeed? There is no option . . . the alternative is literally 'Hell on Earth'.

Screen Shots from the Atari ST version  
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## CHRONO-QUEST

Amiga/Atari ST

## BAAL

Amiga/Atari ST



# ALERT BOX

## Amiga at the Winter CES

BY NAT FRIEDLAND, AMIGA Plus Editor

### Amiga at the Winter CES

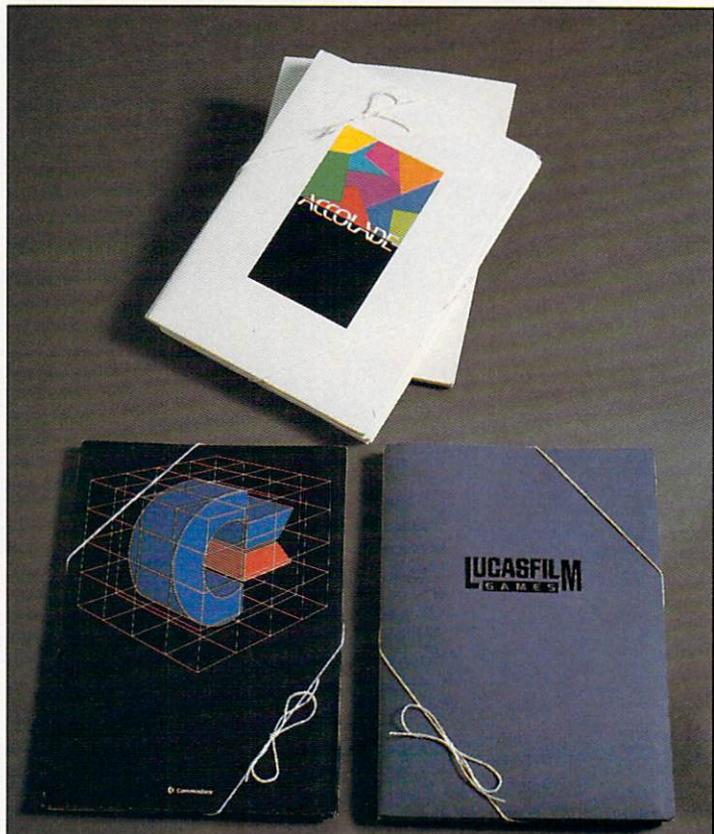
Alert Box will usually consist of short news items concerning the Amiga Community, but the deadline for this premiere issue of AMIGA Plus came at the same time as the Winter Consumer Electronics Show. So here's a special report about the 1989 Amiga activities at Las Vegas . . .

When it comes to computers, the menu at CES is games, games, games. Computers are actually only a small part of this vast trade expo that covers every kind of consumer electronics from VCRs to cellular phones. Dominating the computer hall was Nintendo, which took up about one quarter of the total floorspace. Commodore's exhibit area was right by the entrance and it was devoted primarily to third-party developers showing off their latest crop of game conversions, interspersed with a sprinkling of newer applications such as the impressive **Photon Paint 2.0** from MicroIllusions.

The games were more or less the same titles seen at November's COMDEX all-computer show, except now they were about 45 days closer to marketability. Overall quality was very good—a noticeably higher standard of graphics and playability than existed only a year or two ago!

Typically, today's new computer games come out first on the IBM PC, where the biggest user base and the biggest bucks can be found. If it's an arcade-type game, it's likely to have been an arcade coin-op hit—or on Nintendo—before getting ported over to the personal computer market.

Expect to pick up about 10 pounds of press kits when you attend one of the major computer trade shows.



As the new PC game is shipped, additional computer conversions are usually announced. More likely than not, it's the Amiga and possibly the C-64 and the Macintosh. Less often it's the Atari ST and the Apple II. Many European import games have the Amiga and the ST version ready to go, by the time they arrive in the U.S. And increasingly, American developers are turning to European software houses to make quick, dependable, cost-effective Amiga conversions.

Having now glanced at the big picture, here are some of more interest-

ing new game developments seen at the latest CES.

### Game Show

Sierra On-Line was out to prove that they have stopped releasing Amiga games with graphics that look like unchanged copies of clunky 8-bit screens. Sierra showed **Space Quest III** which has ultra-sharp, detailed visuals and a lengthy, full-textured sound score. The secret is that their new releases are being originated to run on PCs with fast 386 processors and the latest EGA color format—plus new plug-in

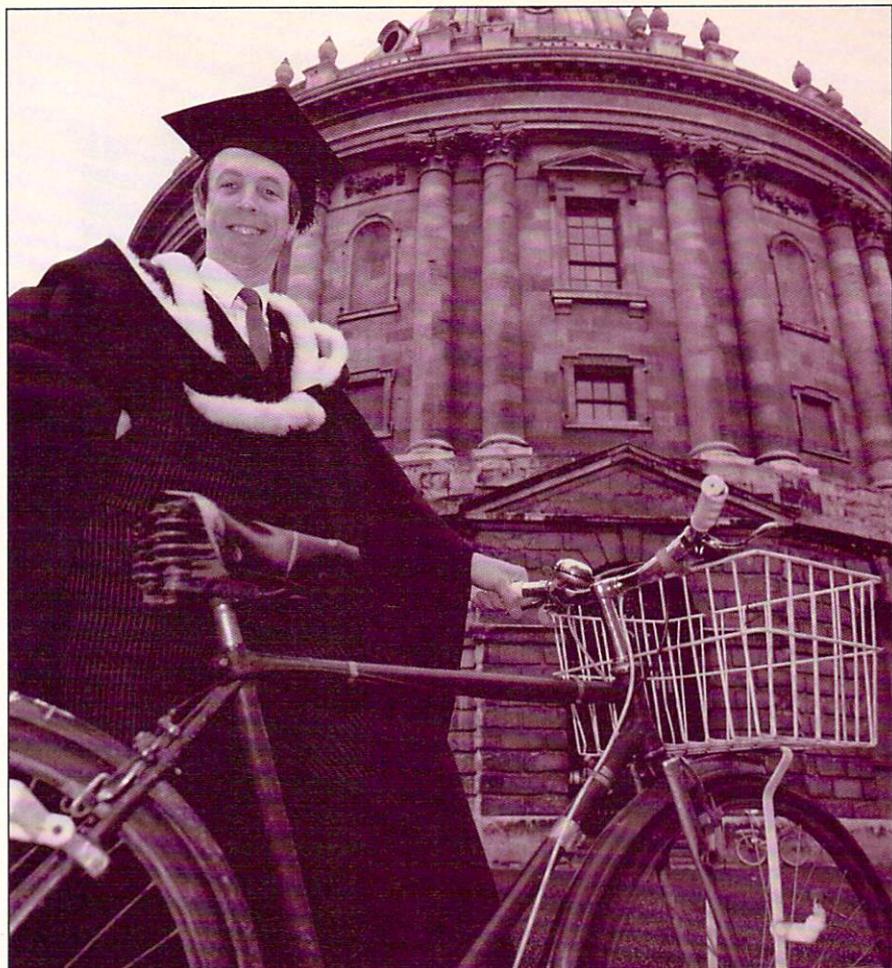
synthesizer cards. So, of course, the conversions look and sound fine on an Amiga *without* any extra hardware add-ons.

Over at Mediagenic's enclosure (only open to the trade and press), a lot was going on: **Savage** is Rainbird's newest large-scale, fast-action, graphically detailed dungeon arcade epic. Lucasfilm had the just-finished **Zak McKraken and the Alien Mindbenders**, a big "Hitchhiker's Guide" type of adventure with a slick graphic interface that lets you control things with mouse-clicks instead of a lot of typing. Interplay, the makers of **Battle Chess**, are following up with a hot adaptation of the award-sweeping science-fiction book, **Neuromancer**. You start out in the Chiba City underworld, trying to find out why all the other computer cowboys are vanishing. The solution must be found by jacking into Cyberspace with your best icebreaker devices and burglarizing the well-guarded databases.

This time around, Microprose did not bring along their Link Trainer that people sit inside and move under control of Microprose combat flight simulator software. Instead, the Maryland company kicked off a drive to expand and diversify their product line by starting an affiliated marketing company—Medalist International—that will release a wide variety of software developed by other publishers. Meanwhile **Silent Service**, the premier WWII submarine simulation, is leading the way for a series of specially enhanced Amiga conversions of the Microprose hits—including the **Gunship** helicopter simulator and the brand-new **F-19 Stealth Fighter**.

Tengen, a major Nintendo developer (**Gauntlet**, where you can be either a hero or a heroine) is branching out from game machines. Their Amiga **Pac Man** has a 3-D maze and gives you a chance to jump over the ghosts. Another arcade/Nintendo stalwart, Data East, has **Bad Dudes** and **RoboCop** joining **Platoon** in their Amiga line-up.

**Hostage**, where you control a



In tribute to Microprose Software president "Wild Bill" Stealey—a former Air Force pilot often photographed standing next to high-performance aircraft in his flight suit—"Mild Andrew" Hewson celebrates the signing of his British software company to a marketing deal with Microprose's Medalist International division by posing in academic garb at Oxford University.

SWAT team trying to clear terrorists out of a high-rise, is a challenging multi-viewpoint action game coming from Mindscape, along with **Combat Course** which gives you the option to design your own obstacles. Taito, which used to license some personal computer versions of their arcade hits (**Arkanoid** to **Discovery**, etc.) will be issuing their own Amiga releases in '89. **Times of Lore**, a blend of arcade action and fantasy role-playing, is coming our way from Origin, home of Lord British and his Ultima series.

California Dreams' **Triango**, a Go-like game that pits you against the computer, made addicts out of several AMIGA Plus publishing executives when we brought back an advance copy. **Sim City** from Maxis (Broderbund distribution) is an un-

usual city simulation where you, as mayor, strive for voter confidence while you balance the conflicting demands of urban life—and if you get burnt out, you can select massive disasters such as earthquakes or Godzilla attacks.

England's Psynopsis is planning to release some 17 Amiga and ST titles in 1989. Cinemaware showed **Lords of the Rising Sun**, a truly epic simulation where you scheme and battle to become Shogun and rule all of old Japan. Two more games coming from Cinemaware are **It Came From the Desert** and **TD Sports Basketball**. And at Spectrum Holobyte, two hush-hush projects are due before summer—one is an incredibly detailed urban auto-racing game and the other is an interlocking series of military simulations. ■



# Make Amigos With Other Amigas.

The largest group of Amiga® users in the world shares its problems and solutions online every day in CompuServe's Amiga Forums. And you can join them.

Whether you're an Amiga novice or a professional user in broadcasting, film special effects, animation, or music production, you'll find support from thousands of Amiga users and nearly every third-party Amiga software and hardware vendor.

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# GURU BUSTERS



**Answering Amiga users' technical questions**

BY HARV LASER



*(We think it's pretty hokey when the first issue of a new magazine prints "Letters From The Readers" which obviously must be fake or solicited. Instead, AMIGA Plus asked Harv Laser, the AmigaZone sysop on People/Link, to assemble some informative technical Q&A exchanges from various online sources. Laser is now working on a comparison survey of all Amiga telecommunications software for a future issue of AMIGA Plus. Meanwhile, readers are invited to send us your real comments and questions about Amiga computing . . . and about this magazine.—THE EDITORS)*

**Q:** I WAS PUTTING SOME NEW FONTS IN MY FONTS: DIRECTORY. THE FONTS CAME IN DIFFERENT SIZES AND I ONLY WANTED TO COPY A COUPLE SIZES OF EACH—SO I COPIED THEM OVER AND NOW THEY DON'T WORK RIGHT. WHAT DID I DO WRONG?

**A:** Each Amiga font has a header file—you'll see it in your FONTS: directory with a suffix of .font. When a font is first created, the font editing software (either the one on your Extras disk, or InterActive Softworks' Calligrapher software) creates that header file to store the point sizes of that particular font. When you move fonts from one disk to another and you don't move all of a font's associated "numbered" files, the header file becomes invalid. This will confuse software—such as word processors or paint programs—that first looks at the header file when loading a font.

You need to run FixFonts against your FONTS: directory. This little program, which is provided with the Amiga 1.3 Enhancer software, checks each font's header file against the point sizes in each font's directory. If necessary, it repairs the header file to reflect only the actual point sizes you have stored in each font's subdirectory. If you want to move or copy more sizes of a particular font in the future, do it and then run FixFonts again so your fonts' header files will be correct.

**Q:** I WANT TO USE THE NEW "RAD:" RECOVERABLE RAMDISK THAT CAME WITH 1.3 AS A "VIRTUAL" FLOPPY DRIVE SO I CAN DISKCOPY DISKS TO IT. I TRIED TO MOUNT RAD: AND THEN DISKCOPY TO IT BUT IT DIDN'T WORK.

**A:** You need to change the mountlist entry for RAD: in your Mountlist which lives in your DEVS: directory. For RAD: to mimic a floppy disk it needs to have the same number of tracks or "cylinders", which for a physical floppy drive on an Amiga is 80 (numbered 0 through 79). Change your RAD: 's mountlist entry so that "low cyl" is 0 and "high cyl" is 79 and save the mountlist back to disk. Remember, you'll need sufficient RAM in your Amiga since RAD: 's size is static—it will always eat up as much memory as you allocate to it no matter how much data you actually put into RAD:. To emulate a floppy disk in RAD: requires at least one megabyte of RAM on your system.

If your RAD: disk is already

mounted you'll need to delete everything from it, run RemRad to remove it and then perform a warm boot to remount your new 80 cylinder RAD:. Then try your diskcopy. The same holds true if you want to make a very small RAD: disk as a bootstrap disk to mount your hard drive each time after a reboot or Guru error. By trial and error, reduce the "high cyl" figure in RAD: 's mountlist entry until you are allocating as much memory to RAD: as will do the job for you.

You can calculate high cylinder if you know how many bytes you need in RAD:. There are 512 bytes per sector, 11 sectors per track, two tracks per cylinder, and "high cyl" +1 cylinders—11K per cylinder allocated. Also, you may need about 28K extra for directory information and a File Allocation Table (FAT).

If you're an Amiga 1000 owner you get the capability to reboot from RAD: as soon as you start using the new 1.3 Kickstart. You A500 and A2000 owners can use RAD: as a recoverable RAMdisk, but you can't reboot from it until you have the new 1.3 ROMs installed in your computer.

**Q:** I WANT TO PRINT OUT SOME OF MY DISK DIRECTORIES. IS THERE AN EASY WAY TO DO THIS WITH AMIGADOS OR DO I NEED A SPECIAL DISK CATALOG PROGRAM?

**A:** This is very easy to do using AmigaDOS' "redirect" symbol which is the "greater than" [>] character on your keyboard. When you ask for a disk directory, the output of your command line is printed to your con-

sole, normally the CLI window. You can redirect the output of most commands to a disk file, or to another device like a printer.

By typing "DIR >PRT: DF1: OPT A" at the CLI you would get a hardcopy printout of the entire directory of whatever disk you have in drive DF1: including all subdirectories, if any exist. "OPT A" is a modifier for the DIR command which means literally all directories, subdirectories and files.

If you'd rather dump a disk's directory to a file, so you can load it into a word processor or editor and write more comments in it, just redirect the output to a filename instead of to the printer like this: "DIR >RAM:FOO DF1:". This would create a file on your RAMdisk called FOO whose contents would be the directory of whatever disk you had in DF1: at the time.

Remember that in AmigaDOS the redirect symbol immediately follows the command itself, as in the examples above. Output redirection is one of the handy features that makes AmigaDOS very powerful and flexible. (*See the Amiga Shell article in this issue for additional related tips!*—THE EDITORS)

**Q:** I DOWNLOADED A BUNCH OF FILES FROM A LOCAL BBS AND THEY WON'T RUN. AMIGADOS COMPLAINED THAT THE FILE WAS "NOT AN OBJECT MODULE." HELP!

**A:** Chances are you downloaded files that were compressed with a program such as ARC or ZOO. These compressors are in wide use by people who upload to Bulletin Boards and national information services. Files are compressed for a few reasons, the most important of which are:

- 1. The compressor makes the file smaller so it takes less time to upload and download.
- 2. The ARC and ZOO programs can put many files together into one file. For example, to download a program plus its documentation and its icon, you only need to perform one download instead of three.
- 3. Many file transfer protocols

such as XMODEM pad file endings, in order to send the files in equal blocks—commonly 128 bytes. Compression programs will automatically strip off the padding.

Before you can use the software you've downloaded you must decompress it. If the file has a name ending with .ARC you can use the ARC program itself, or its smaller brothers UNARC and PKAX. If the file's name ends with .ZOO you need to use the ZOO program to decompress it after downloading. ARC, UNARC, PKAX and ZOO should all be available from the BBS or service you've been using. Ask the sysop for help if you can't find them.

If your files don't have .ARC or .ZOO extensions, they may need to have the padding removed. A public domain program called FixObj will do this. A sure sign of this problem is a file size that is an exact multiple of 128. Many terminal programs have an auto-chop option which automatically strips off the padding when the download is completed.

**Q:** THE OTHER DAY I WAS FORMATTING A STACK OF NEW DISKS. AFTER I FINISHED, NONE OF MY DOS COMMANDS WOULD WORK! IT WAS DRIVING ME CRAZY. WHAT WENT WRONG?

**A:** I was stung by this little beauty myself, when I was just starting out on the Amiga. I was formatting a stack of new disks and for simplicity's sake called the first one 'A', the second one 'B', and so on. I happened to leave the disk called "C" in my external drive, and then rebooted and started to do some other CLI work. None of my DOS commands were recognized. I rebooted, still nothing. I powered off my Amiga and after bringing the system back up, I still couldn't get any DOS commands to work. I went crazy—calling friends and asking for help, reseating RAM chips because I thought it was a memory problem and so on.

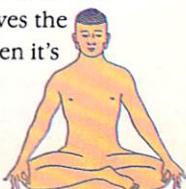
Finally it dawned on me—AmigaDOS makes a few logical "assigns" to directories on the bootup

or system disk. C:, S:, L:, DEVS:, FONTS:, LIBS:, and SYS: are all assigned to the boot disk *unless* a disk is in one of your other drives and its name is one of those seven logical names. Then the disk with that name will override the assign that AmigaDOS is trying to do at boot time. Since I had a disk called C in DF1: when I rebooted and that disk contained no AmigaDOS commands (remember, I had just formatted it), when AmigaDOS assigned the system resource C: to it, naturally I had no DOS commands! So unless you specifically want to override your system disk's assigned directories when you reboot, avoid giving your freshly formatted disks those seven names.

Even without rebooting, a disk name will override a logical device name. This can be especially handy with disks called Fonts, although some programs cannot handle large numbers of fonts. You don't have to assign FONTS: to some other directory; you can simply pop the disk with that name into the drive, and the computer will look there for any fonts you want to use.

**Q:** I JUST NOTICED THAT ONE OF MY DISKS IS NOW CALLED "LAZARUS." I NEVER GAVE IT THAT NAME BUT THAT'S WHAT IT SAYS ON THE WORKBENCH UNDER THE DISK ICON. DOES THIS MEAN I HAVE A VIRUS?

**A:** Nope, it's not a virus. Your disk is labelled "Lazarus" because you ran the AmigaDOS DiskDoctor command on it. DiskDoctor tries to recover files from a damaged disk. In doing so, it actually writes to the disk and when it has finished its job, it renames the disk as Lazarus. What you should do after DiskDoctoring a disk is to copy all the files from it to a new disk, and then reformat the Lazarus disk to see if it is still usable. If it can't be reformatted, or if it still has errors after you reformat, it's best just to throw it away. DiskDoctor raises files "from the dead," thus it gives the disk that Biblical name when it's finished. ■



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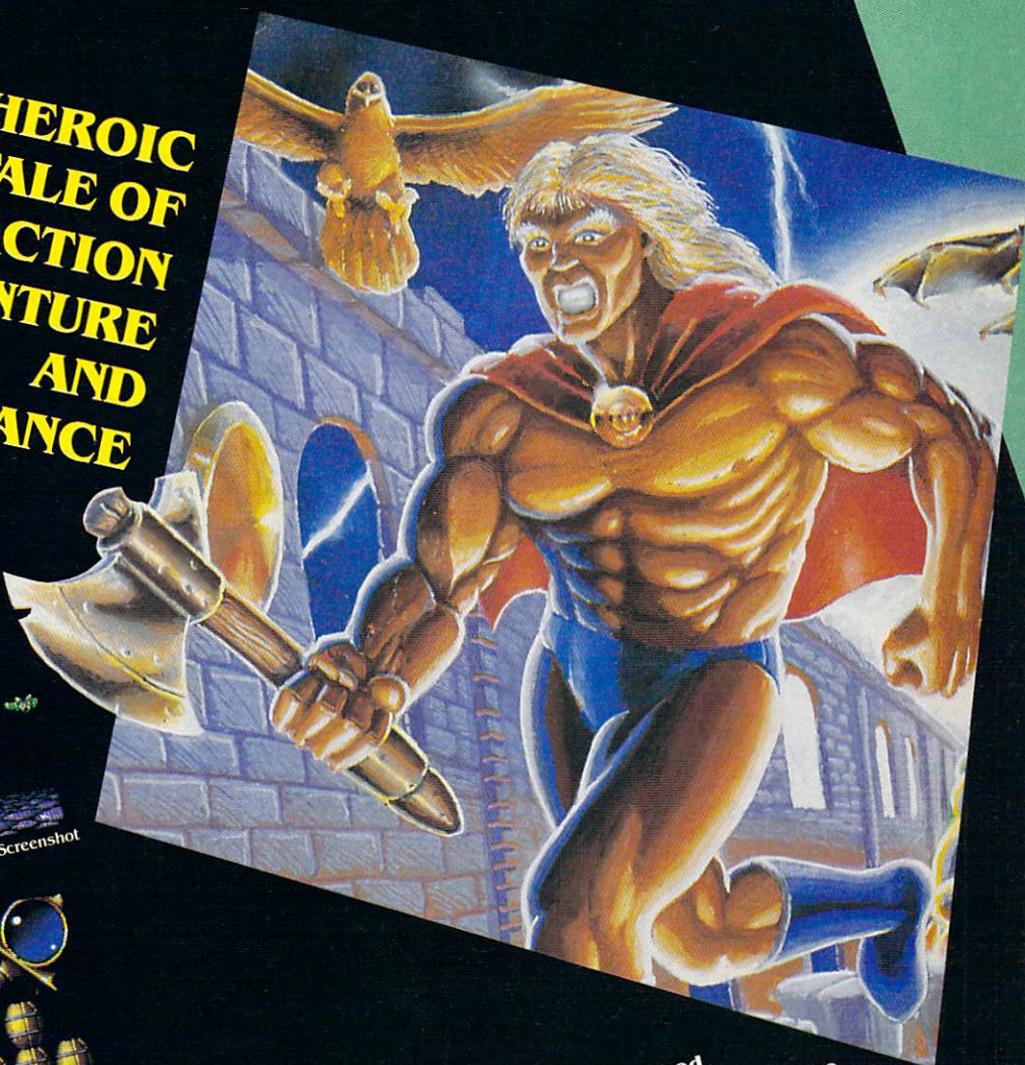
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HAPPY GUY



## Amiga Re-creates The '30s "Rubber Hose" Cartoon Style

Article,  
Illustrations & Disk  
Animation By  
Steve Segal

*I*t's not exactly simple to produce an Amiga cartoon in a distinctive classical animation style. But here's how one of Hollywood's top craftsmen did the job . . .

The idea behind my little Happy Guy sequence is to use the Amiga for making character animation in the style of the early '30s cartoons—especially George Pal's Puppetoons. If you aren't familiar with Puppetoons, find the videotapes of Pal's feature film "Tom Thumb", or the "Puppetoon Movie" which contains an anthology of Pal shorts. Pal's movies had sculpted wooden figures which moved more like drawn cartoons than puppet films because his crew (Ray Harryhausen among them) sculpted a different figure for each frame. (And you thought computer animation was hard!) These puppet figures were placed in a three-dimensional set that the camera moved through.

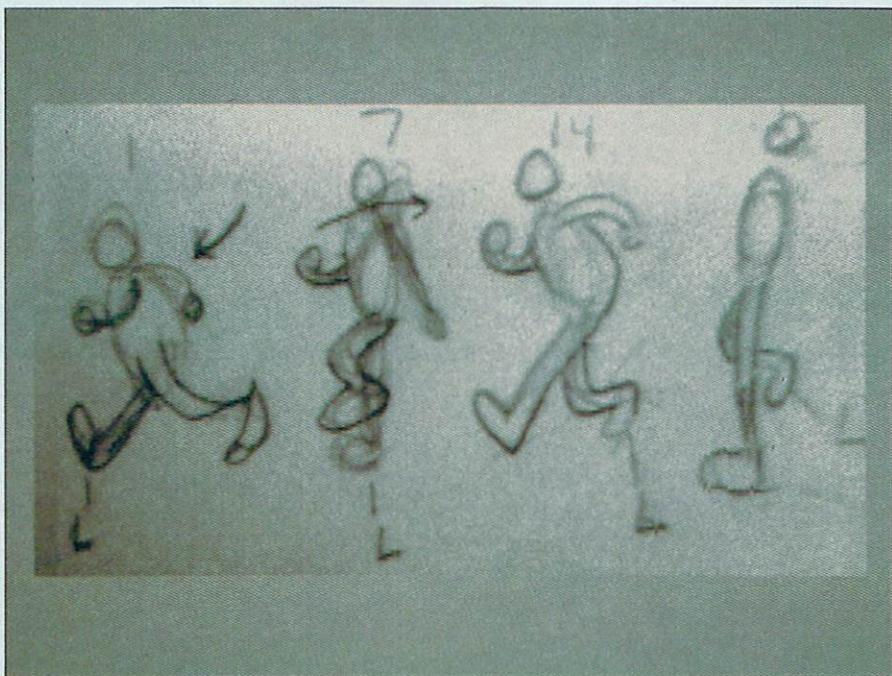
Other '30s cartoon animations like the early Mickey Mouse had arms and legs animated in what was called the "rubber hose" style. This means that they moved like hoses (duhhh!) instead of like straight limbs. Even though straight limbs are actually more true to the way an arm or leg is constructed, rubber hose style mimics the appearance of how a "limber" person moves. Anyway, cartoons aren't supposed to look real, they're just supposed to be fun. (Incidentally "Pee Wee's Playhouse" showed a few Puppetoons on the show's King of Cartoons segments. Since it was my job to find the cartoons during the second season, I showed some Puppetoons to Paul Reubens (Pee Wee) and he liked them.)

I made Happy Guy using Byte By Byte's **Sculpt 3D**. I started with a sphere for the body, in order to minimize the number of vertices. I col-

ored the top vertices different from the bottom. That way I could put pants and a shirt on the character with just one simple sphere. You can usually get away with using a sphere that has just one subdivision because the Smoothing command keeps the edges from showing. If you were going to zoom in close to the sphere, you would need to subdivide by a greater number. But it's easier to work with fewer vertices, quicker to move around the screen, takes less memory and disk space (in every key frame) and it renders more quickly. So you should always simplify if you can.

For the head I started with another simple sphere. The hair and eyes are colored faces of the head sphere. I needed to subdivide certain edges to get the hair and eye shape that I wanted, but it's still a lot more efficient than subdividing the entire sphere. The pupils are circles placed in the center of the eye area. And the faces of the eye are filled in, so the pupil is part of the head sphere. Admittedly there are more faces than if you placed the pupil in front of the white of the eye. But doing it this way you don't have to worry if the white goes in front of the pupil, or if the pupil sits too far in front of the white. It's also quicker to render since the computer doesn't have to figure what's in front of what. The nose is a sphere that's expanded on the X-axis to make it long and thin.

The arms need to look flexible, so I started with a four-sided circle. (I know a four-sided circle is a square, but there is no Add Square command). I extruded the square a short distance, and then without deselecting the square I extruded again and again and again. So now I've got a long box with several segments. The box can look like a round tube just by implementing the Smoothing command. I made the other arm by making a duplicate. His hands are just more spheres. The legs are made the same way. I wanted the shoes to have flat bottoms so I moved the tri-view to an empty area and made a sphere. Then I moved the top half of the



Digitized illustration, preliminary sketches for "Happy Guy".

sphere outside the tri-view and pressed the select gadget (three dots). This selects only the vertices that are visible on the screen. I erased selected vertices, then selected and filled the bottom ring of vertices which used to be the middle of the sphere. If the vertices weren't fillable I could have filled them by hand—selecting any two bottom vertices and pressing the edge builder (triangle) gadget.

Naming vertices is very helpful for ease of animation. First I made a top level name—"L-arm" for example. In this case I selected no vertices. L-arm would be more like a drawer containing named vertices. Next I named each of the rings of the L-arm. One easy way was to resize the tri-view so only one ring was visible at a time. I had to make sure all the vertices of that ring were visible and no others. Then I clicked the select gadget and all the visible vertices were selected. Sometimes I had to select each vertex separately by hand. Then I named selected vertices as offspring of L-arm. Each ring was an offspring of L-arm. Of course I had other sets of rings that were offsprings of R-arm and the legs.

My hierarchy is shown in the table below. The r1 stands for ring 1, the top circle making up one of the tubes for arms or legs. So r1 on an arm would be at the shoulder and r3 would be around the elbow.

BODY				
L-arm	R-arm	L-leg	R-leg	Head
r1	r1	r1	r1	l-eye
r2	r2	r2	r2	r-eye
r3	r3	r3	r3	hair
r4	r4	r4	r4	
hand	hand	foot	foot	
		toe	toe	

The key to animating in rubber hose style is to *move each ring a little bit at a time* so that it looks like it is bending!

For example: From the Edit Menu under Select Named Vertices, I can select the offspring of L-arm—which would be r4 + hand. I then placed the cursor over r3 and clicked two to four times on the rotation gadget—which moves that ring and hand about 10–40 degrees. Then with r4 + hand still selected I selected r3 and placed the cursor over r2 and ro-

tated. For the arm I would usually do this in both the side (west) and top (down) view. That way the arm would move across his body. From the top view I would usually click once or twice. There was a lot of trial and error on this. In the same way I named the legs, and even the toe so it could bend when touching the floor. I put in the Sculpt 3D ground as a reference and placed a large reflective triangle in the same place. The reason I used the ground is that you can't see edges if the vertices are outside the tri-view. When I was ready to render, I removed the ground from all keyframes.

To make the animation, I first sketched the positions I thought I would need to represent a cartoon walk. (See digitized illustration.) I used five keyframe positions. Then I moved the limbs to match my sketch. When I had all my keyframes, I previewed the animation. I examined the preview carefully and wrote down notes about things I needed to change and in what frame those changes needed to happen. In the first preview, my guy looked as if he was walking with a limp. I realized that at one keyframe he wasn't bending his leg enough, so I studied the preview to figure out where that happened. Sometimes you can use action cues like "when he bends his head down, the leg should be bent more". But this is a task!

There are a couple of things you can do to make this easier. If you make the duration time greater than the default of two, it will be easier to study the motion. (NOTE: You must remove the parenthesis as well as the number, but you don't need to put in new parentheses. And if you do it to the first frame, it will be applied to all the subsequent frames.) If you have trouble finding motion cues, you can place some obvious object—such as a simple triangle that moves across the screen from frame 1–5, holds still from 6–10, then moves again, etc. This kind of thing is very helpful to identify places in your animation.

It is a good idea to make a copy of your keyframes before you add un-

wanted reference stuff, in case these additions and subtractions make the keyframe structures incompatible. It is possible to add an object to a keyframe, but it must be added to all keyframes or they won't work together. NOTE: **Sculpt-Animate 4D**, Byte by Byte's newest product, shows the frame number in the upper left of the preview screen, and the preview or animation can be slowed down or stopped interactively while you're playing the animation.

On my preview, I also realized that the motion wasn't at the right speed. So I wrote new numbers under my sketch to keep track. If I wanted to change keyframe 10 to 8, I would use Modify Take to load keyframe 10, then say No to the keyframe requester, Change Current Frame to frame 8, make it a keyframe and Save Current Keyframe. Another way to do the same thing is to rename the files using CLI or a program like Diskman. You just rename HappyGuy.10 as HappyGuy.8 Then you make the new keyframes simply by saying Yes to the new keyframes and just say No to the old keyframes. I'd advise you to take notes. I always lose track of what I've changed and what I haven't.

When I had the animation the way I liked, I rendered it. Only then did I realize that my guy passed his arm right through his body, so I went back and readjusted the keyframes. This time I rendered in painting mode (Sketch mode is faster, but it's

inaccurate concerning what objects pass through each other.) The painting mode looked pretty good, so I was ready to render in snapshot mode. I didn't think I needed photo mode because there was really nothing to show shadows. Shadows

## Cartoons aren't supposed to look real, they're just supposed to be fun.

wouldn't appear very well on a reflective floor, and mirror objects work in snapshot mode. That rendering looked pretty good, although I made one mistake which is still there. I turned on anti-aliasing for the first keyframe and thought it would apply to the whole animation, but it only held until the next keyframe at frame 6. So if you want anti-aliasing, apply it to all keyframes.

Byte by Byte wanted to use the Happy Guy animation as a demo for their software, and they suggested that I put my name on it. So I decided I would have my guy walk past a sign with my name on it. I didn't want to render the animation again, so I typed my name in **Zoetrope** and used the APM (Antic Pixel

Mover) controls to make it move back in perspective. Then I did a color fade so the name would fade to black, and saved each frame as an IFF file. Using **Photon Paint** I loaded each individual frame of Happy Guy, and on the alternate screen I loaded the corresponding Zoetrope frame. I made a brush of my name and pasted it onto the frame with my guy. As a test I did this to every fifth frame and made a take that was only six frames long. I did this to make sure the process would work, because sometimes the color palettes don't match, especially when you do a color change across frames. Miracles do happen and it worked! But I could see that the angle of the sign was wrong, so I drew grease pencil reference lines on my monitor and animated my name again. The colors were the same and I just went ahead and did the whole process for all 21 frames. I went back to Sculpt 3-D and under Modify Take I chose Render All. Since all the frames were already rendered, it started compressing right away.

After about a hour it had compressed all the frames into the anim file you see now. And after all that work, I'm glad it cycles so I can show it to people for more than two seconds. One final note: Sculpt-Animate 4D has the ability to make objects into splines, so you can bend legs simply by naming the middle ring. But splines really slow down the processor. As always it's a tradeoff, but splines are definitely easier. I hope this is some help in working on your own animations, but I'm sure your project will have a whole different set of problems and solutions. ■

## Software Information

### SCULPT 3D \$99.95

Byte by Byte, Arboretum Plaza II, 9442 Capitol of Texas Hwy. N., Suite 150, Austin, TX 78759. (512) 343-4357.

CIRCLE 236 ON READER SERVICE CARD

Steve Segal created the classic Amiga videotape "Dance of the Stumblers" and is probably the premier Hollywood animator regularly using the Amiga.

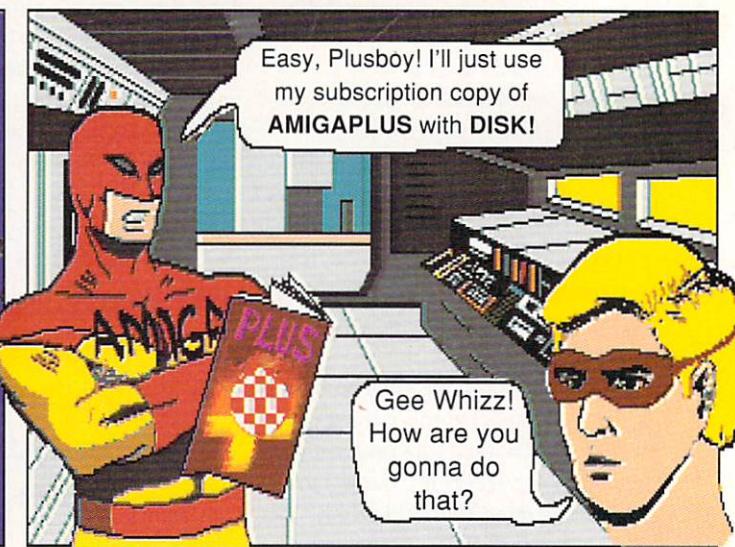
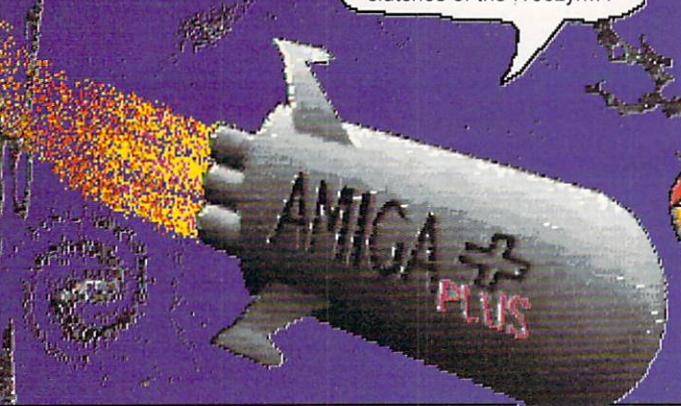


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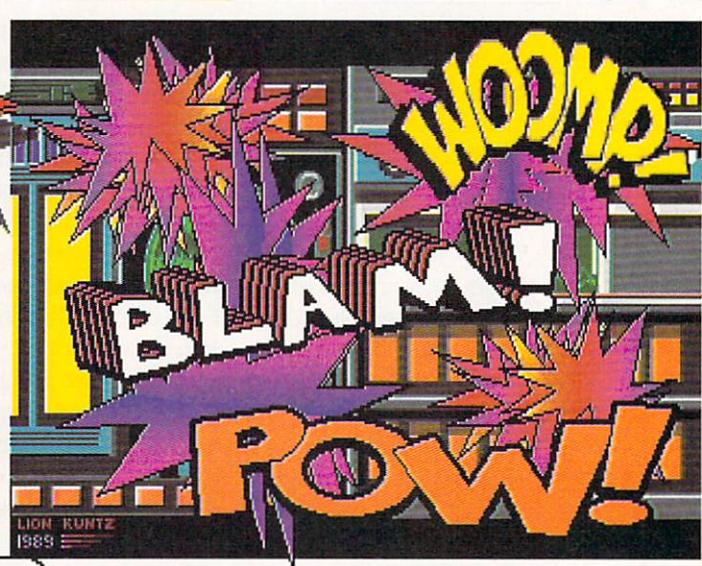
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# HiSoft Devpac Amiga

FASTEST AMIGA ASSEMBLER YET!

Reviewed by Steve Faiwiszewski

**Devpac Amiga, Version 1.21** is a speedy assembly language development tool which provides an excellent alternative to the original Metacomco assembler supplied by Commodore. MichTron's British import consists of an integrated editor/assembler program (GenAm), a stand-alone symbolic debugger (MonAm), a stand-alone command-line oriented version of the assembler (GenIm), an installation utility (GenInst), a directory of include files, a couple of example assembly programs and a manual.

(NOTE: This review examines version 1.21 in HiSoft's actual British package. For the U.S., MichTron is releasing DevPac Version 2.0, which we received at deadline. Priced at \$99.95, Version 2.0 is claimed to assemble at a speed of 70,000 lines per minute and has also improved the interface of the previous release.

—THE EDITORS)

The GenAm full-screen editor allows simple editing of text files. Its commands are a hybrid of WordStar and Amiga BASIC style editing. Standard editor functions—such as searching/replacing a string, inserting a file, cutting and copying blocks—are available through Intuition menus

as well as keyboard shortcuts.

Unfortunately, the editor has some annoying restrictions and idiosyncrasies:

- Only one file can be edited at a time. While this will suffice for simple editing, any user who has used other editors will long for the ability to edit multiple files.
- The editor's buffer size is fixed at startup time. So if the user wants to edit a file which is larger than the current buffer size, the editor must be exited and reinvoked with a command line parameter specifying a larger buffer. This is inexcusable, because the Amiga supports dynamic memory allocations quite nicely. Version 2.0 allows the buffer size to be changed from within the editor by selecting the Preferences menu option, but it is still not automatic.

## GenAm Assembler

The integrated 68000 macro assembler can be invoked from within the editor via a menu selection or a keyboard command. The Devpac assembler is almost completely compatible with the Metacomco assembler. It can produce directly executable programs, as well as

Amiga-standard object files which must be linked by ALink or BLINK. It can also include symbols in the object file for use during debugging. These symbols will be correctly handled by the accompanying debugger, as well as other debuggers such as MetaScope.

The assembler's speed is spectacular! It took only 30 seconds to assemble a 25K file (1,008 lines), while the Metacomco assembler (Version 10.178) required three minutes to do the same.

## Editor/Assembler Integration

The editor and assembler are integrated quite nicely. While in the editor, a keypress invokes the assembler. First you get a requester, prompting for the name of a binary file to create and then a name of a listing file. The assembler then clears the editor's window and proceeds to assemble, displaying any warning or error messages in the window.

Once assembly is completed, the source file is redisplayed and control passes back to the editor. At this point the user may step through any assembly error using a menu option. The editor will place the cursor at the offending statement and will display the error at the bottom line.

I do have two gripes with the way the editor and assembler were integrated:

- The editor can only keep track of the first 30 errors, but the assembler will keep assembling even after 30 errors were encountered. There should be an option to tell the assembler to abort after 30 errors.
- If a line is deleted from or added to the source, the editor loses the list of assembly errors. This is a feature rather than a bug, but it's unacceptable nonetheless. There are other editors (Benchmark Modula-2 editor, for example) that maintain a correct list of errors even if some additions or deletions were done to the source.

### **GenIm Standalone Assembler**

The CLI-based assembler behaves in the same way that the integrated one does, with one notable exception. While the integrated assembler may be interrupted by either pressing Esc or Ctrl C, or clicking on the close gadget, GenIm cannot be aborted at all. It will continue running until assembly is completed. GenIm can be made resident, using the RESIDENT CLI Command or WShell. Making the assembler resident results in faster invocation of the assembler.

The supplied include files are based on the ones issued by Commodore. But they were adapted to work with the Devpac assembler. I found one error in the file intuition/intuition.i which caused an assembly error. I was able to correct the problem after comparing a few of the Devpac includes against the original Commodore files.

MonAm, the stand-alone debugger, is a powerful tool that can be used to track down bugs in assembly programs, as well as programs created using high level languages such as C or Modula-2. MonAm uses its own screen so it will not interfere with the output generated by the program being debugged.

MonAm displays four windows. Register Display is the top window,

showing the values of the data and address registers, as well as the SSP (Supervisor Stack Pointer), PC (Program Counter) and SR (Status Register).

Memory Display shows memory content. This second window display consists of four lines of 16 bytes each. Memory is shown in word-aligned hex, with the ASCII representation on the right hand side.

Instruction Display is the third window, showing memory in disassembled form and displaying symbols instead of numeric addresses wherever possible.

### **A complete assembly package in an easy-to-use environment.**

Command Window contains the command prompt as well as some messages generated by MonAm. All user interaction is done in this window. MonAm is purely command line driven, with no Intuition interface at all (no menus or gadgets).

MonAm has the usual features of a debugger. It can display memory either in hex or in ASCII, as well as in disassembled form. It can modify memory content as well as search memory for specific values. It can display register content as well as modify registers. MonAm can single step through a program's code and trace through it. (Tracing is nothing but rapid single-stepping.) It has the capability to set breakpoints in the code, allowing the program being debugged to run at full speed (tracing is slow) until a breakpoint is encountered and control is passed back to MonAm.

In addition to these standard features, MonAm sports some unusual ones. It has the ability to force a runaway program to quit, or to just stop it (reverting to single-step mode). The manual warns about us-

ing this feature, because forcing the program to quit will cause it to terminate without cleaning up. And thus it will not release any allocated resources. Also, stopping a program is dangerous if it is in the middle of executing some ROM routines. Additional features are: BCPL pointer to address conversion, intelligent memory copy, patterned memory fill, and base conversion.

Two major restrictions in MonAm are its inability to load in a program once the debugger is running (the program to be debugged must be specified at the start of debugger execution), and the inability to load any debug hunk other than the first one. The DevPac assembler—as well as Aztec C—generates only one debug hunk. But executable files generated by Lattice C, or by linking multiple object files, may contain multiple debug hunks. MonAm will not be able to load all the debugging information from such files.

### **Wish List**

To make the package ideal, I would add the following improvements:

- Provide the editor with an ability to edit multiple files.
- Add an ARexx interface to the standalone assembler. This will allow integration of the assembler with other editors that support ARexx.
- Improved editor functions, especially tracking of assembly errors.

Summing up, HiSoft Devpac Amiga provides a complete assembly package. Although the editor/assembler combination is not as polished as it could be, it does offer an easy-to-use environment with the fastest assembler I've seen on the Amiga to date.

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*Steve Faiwiesewski of West Orange, New Jersey is a widely published reviewer of Amiga Technical products.*

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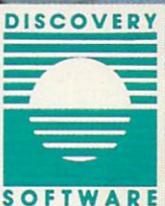
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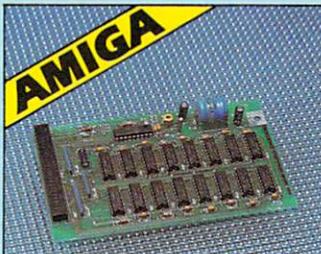


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# A-MAX ARRIVES!

## Macintosh Compatibility For About \$150

*Exclusive interview with the creator  
of the Amiga's first Mac emulator*

BY ED BERCOVITZ

*A*miga users can now own three computers in one. PC emulation was already a reality with Commodore's Bridgeboard—especially the new 286-based AT Bridgeboard. Coming this spring is affordable Macintosh emulation, so your Amiga can run the vast libraries of outstanding Mac software—including Hypercard, Excel, PageMaker, etc., etc.

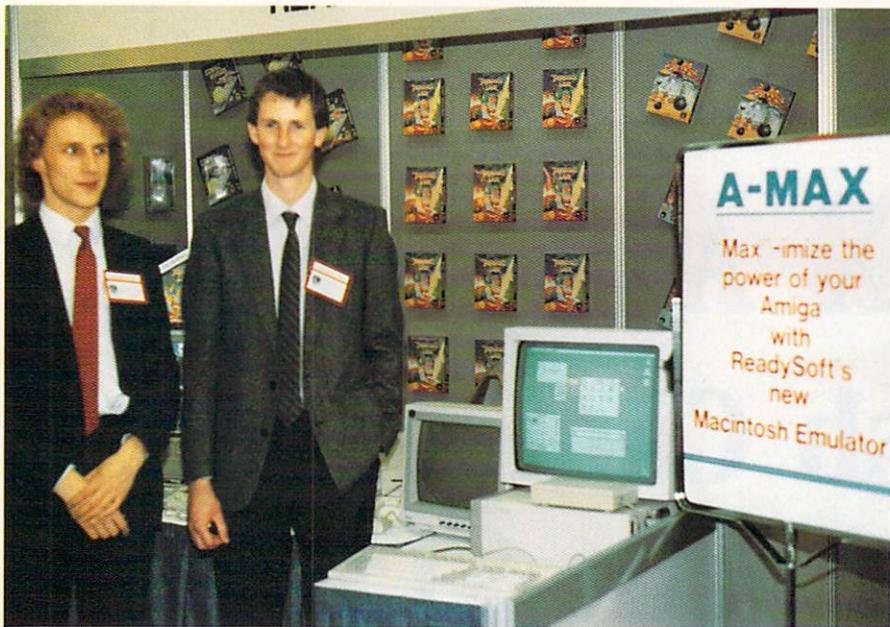
### **I: About Amiga Emulators**

One of the most interesting qualities of personal computers is their ability to change personalities by loading alternate operating systems and imitating other computers. As computer hardware becomes more powerful, both the amount and quality of this mimicry has grown. When the Amiga 1000 was first unveiled in 1985, one of its touted features was the promise to emulate an IBM-PC. After considerable delay, Commodore delivered the Transformer—which did run a limited amount of

MS-DOS software, very slowly.

Several third-party companies also released Commodore 64 emulators for the Amiga. These were all based on the software emulator doing real-time interpretation of object code, so they suffered substantial limitations in speed and compatibility.

With the arrival of the Amiga 2000, Commodore upgraded its PC emulation hardware to the Bridgeboard, a more ambitious unit which runs considerably more MS-DOS software at the same slow speed as a non-turbo IBM XT. At trade shows in recent



From Left: Don Holtz, ReadySoft hardware designer, and A-MAX developer Simon Douglas at World of Commodore. A-MAX is shown running a Macintosh screen generated on an Amiga 2000 and displayed on a 19-inch Monitron monochrome monitor.

months, Commodore has shown its new 2286D Bridgeboard, which boasts an Intel 80286 chip that finally brings Amiga PC emulation up to the respectable speed of IBM's AT series.

### **Magic Sac**

While all this was happening in the Amiga world, interesting developments were taking place on the Atari ST. In 1987, Dave Small of Data Pacific developed the Magic Sac—a successful Macintosh emulator for the ST. One of the problems with emulating a Mac had been the proprietary copyrighted code contained in its ROM chips. Dave got around this problem by making his emulator a combination of both software and hardware, and by using genuine Apple ROMS. Since the Magic Sac emulated one 68000 computer on another 68000, its speed was as good as a real Mac. But since it used the old Mac 64K ROMS, it was only compatible with the original Mac 128. During the next year the emulator was enhanced to eliminate bugs and improve its software compatibility. By mid-1988, Dave Small's new com-

pany, Gadgets By Small, introduced the Spectre 128K ROM Macintosh emulator which added the ability to emulate the Mac 512 and Plus, as well as allowing the ST to run important newer programs such as MultiFinder and Hypercard.

After releasing the first ST Magic Sac, Dave Small did some work on an Amiga version. But due to problems with reconciling Amiga and Mac memory maps, Dave decided by May 1988 to discontinue further development.

### **A-MAX Arrives**

It was a pleasant surprise for most Amiga owners to hear that a prototype Macintosh emulator was unveiled at the World of Commodore in Philadelphia last November. The emulator, dubbed **A-MAX**, is being distributed by ReadySoft Inc., of Toronto, Canada and is expected to be released in March with a retail list price of \$150 to \$200.

A-MAX, like the Magic Sac, is a combination of both hardware and software. However, A-MAX can use either the 64K or 128K Macintosh

ROMs. The hardware consists of a small 1 X 2 inch box which plugs into the external floppy drive port or the pass-through connector on the back of the last external drive. Therefore, it will work with any Amiga computer. The A-MAX box provides a connector for a Mac floppy drive, as well as sockets for the Mac ROMs.

Although A-MAX is marketed by ReadySoft, the emulator was actually developed by Simon Douglas during his final year of studies for a computer science degree in Auckland, New Zealand. Simon recently came to Canada for a brief visit to complete his work on the emulator.

AMIGA Plus arranged an exclusive interview with him to discuss the development, capabilities, limitations and future directions of Macintosh emulation on the Amiga . . .

### **II: Interview With Simon Douglas**

**A+:** Simon, what prompted you to try and do the Mac emulator?

**SD:** It was David Small's work on the Mac emulator for the Atari. I read some reviews of it, though you can't buy a Magic Sac in New Zealand and I never saw one running until I came to North America. One of the reviews said they were planning an Amiga version, but nothing seemed to be happening. I didn't start off planning to do a Mac emulator seriously. It was more of a "hack" job, just to see what could be done.

I started in December 1987. I began the coding then, but I had been looking at the Macintosh system documents and the ROMs for about a month. I carried on with it because things went very well at the beginning. It only took a day of coding to get the Macintosh "question mark" to come up. So I put three more weeks of work into it and wrote a kludgy disk driver and got it to boot. I nearly fell over!

**A+:** Have you done any other commercial or public domain software?

**SD:** On my Commodore 64 I wrote an assembler in BASIC and then used it to assemble an assembler in machine code—real "bootstrap-

ping." I sold a few of those around Auckland. But that was really small stuff. This is my first commercial project.

I don't know when I really decided to go commercial. I was using the emulator a lot with my university compilers. So when you're using something like this for work, you feel you need to fix things to make it more useful. The disk drives were unbelievably slow—10 times slower than they are now. So I did some work to speed them up by five times. I showed it to a friend in New Zealand and he told me to go home and write a letter to some company in the States. I first contacted ReadySoft in July.

**A+**: So you got everything up and running in January last year?

**SD**: It took me three weeks to boot the finder. But the disk driver was not only slow, it could only read one format—no writes at all. There was only one screen mode—512 X 342, the Mac screen size—and only 128K roms could be used. There wasn't even keyboard support when I first booted. It takes a really large amount of work to write a reliable and fast disk driver on the Amiga because of the fairly low-level control you must write, in contrast to machines with dedicated disk controller chips like the ST. The A-MAX disk driver supports three formats—A-MAX, Macintosh and Magic Sac/Spectre—all with good performance. That's quite a lot of work. Also I started working only with the 128K ROMs first and didn't do the 64K ROMs until it was a commercial product.

There was actually one really big problem. One of the most difficult things with the Macintosh is that the system file patches the operating system when you boot it. The system file takes a lot of the bugs out of the OS and all these patches are very hardware-specific. To get it going at first I just ignored the problem and disabled all the bug fixes. So I had a buggy Macintosh system, but it worked. It wasn't until I had code to support these patches that things really started to get reliable.

## **Amiga Vs. ST**

**A+**: When I read some of the background information on the development of the Magic Sac, there seemed to be a lot of work involved in it. Yet for you it seemed to go more smoothly on the Amiga. Did you have an explanation for that?

**SD**: There is a great deal of work in making it into a commercial product, but the initial hack job to make it boot was easier for a couple of reasons. First, David Small was using the 64K roms while I started out with the 128K roms. The 64K roms are more buggy and they absolutely won't run without the bug fixes in the System file. But with the 128K ROMs, though it won't run well if you disable the bug fixes, it can boot some system disks. Once you can boot the Mac OS, it is possible to use a Mac debugger and debug it internally, which makes things so much easier. The second reason is that the Atari ST has all the bus error problems and the "store to memory location 0" problem, which the Amiga doesn't have in any way.

The one area where the Amiga was a lot more difficult than the ST was the disk driver. It's great that Amiga disk hardware is really flexible, but it takes a lot of code to run the drives reliably and fast.

**A+**: Did you have any experience with Macs before?

**SD**: I had used them at university for writing Pascal programs but I had done nothing at this level.

**A+**: How long have you had your Amiga?

**SD**: I've had it since about March 1987, but I wasn't doing much programming at first.

**A+**: And you have a 1000?

**SD**: Yes, an unexpanded 1000 with two disk drives.

**A+**: You code in assembler?

**SD**: Yes.

**A+**: So how many lines of code would it be?

**SD**: At the moment there are about 9000 lines of code in use, the disk driver is around 3500 lines. Most of the code is driving hardware and can be really hard to debug. Because the

emulator takes over the machine, it isn't possible to debug code using Amiga debuggers. You must do everything from within Mac OS, while it's running. Debugging code that gets run when Mac OS is reset can be very frustrating, since there is no system around at all. Also, if you're working on the disk driver and it's not reading correctly, it's impossible to boot up and get a debugger going.

## **Choosing I/O Ports**

**A+**: The A-MAX hardware plugs into the disk drive port. Did you consider using any of the Amiga's other IO ports?

**SD**: It was Don Holtz at ReadySoft who designed the board and worked out a way to put it on the disk drive port. It was a really great idea because you have all sorts of pass-through problems in getting the cartridge out of the way when you want to do some printing.

**A+**: And the disk drive port is the only one that is the same on all three machines.

**SD**: Right. And when ReadySoft went to the World of Commodore at Philadelphia and everyone was talking about the need for a Mac drive, we already had the board sitting on the external drive port.

## **Memory Mapping Problems**

**A+**: What about the memory mapping problem and potential solutions?

**SD**: The problem is that normally the Mac can only handle its RAM in one contiguous block starting at location zero. On the Amiga we have chip memory at this location, but expansion memory (both auto-config and others) is not usually contiguous. You have holes in the address space which the standard Mac memory manager has no way of handling. Also, standard Macs are limited to 4Mb of RAM.

There are several things that can be done to fix this problem. There is code in A-MAX now to permanently allocate the open areas of the address space so that the Mac will not use

them. This allows expansion memory to be incorporated into the system for use by applications. When you are running software with expansion memory like this, the compatibility rate will drop a little (mainly with older programs) from what you get with the 512K system, because a few programs will break with the tricks being used. We found the compatibility to be a lot better than you might expect and the important thing is that MultiFinder runs extremely well, and so does HyperCard, with this solution.

There are a couple of other things that can be done with 1Mb A2000s and A500s. If you have the Enhanced Chip Set from Commodore, you increase your chip RAM from 512K to 1Mb. This allows you to easily emulate a 1Mb Mac with high compatibility. Even without the Enhanced Chip Set, there are a couple of jumpers on the main board that allow the 512K expansion to be brought down to be contiguous with the 512K of chip RAM, creating a 1Mb block. The compatibility is very slightly less, because screen memory must be put low in memory instead of at the high end, as usual. But most non-game programs have no problems with this.

**A+:** Would your second release of the emulator be timed to coincide with Commodore's release of the Enhanced Chip Set which supports 1 megabyte of chip RAM?

**SD:** We've got some prototype 1 meg chips now. So support for them should be in the first release. It's a small change going from 512K to 1 meg of chip RAM.

### **A-MAX Disk Format**

**A+:** Could you tell me a bit about the A-MAX disk format?

**SD:** The A-MAX format is an 800K double-sided MFM sector-based format that is similar to the IBM standard. But we optimised it so that it can be decoded, encoded and checked quickly on an Amiga system. It would have been nice to have been able to use an AmigaDOS (trackdisk) compatible disk format. But when I

tried such a driver I found it performed very badly under the Mac environment. The Mac filing systems (MFS and HFS) make a lot of single block reads that cause a track-based format to be very slow. The A-MAX format performs at close to Mac Plus disk speed with Amiga drives, and even faster with a Mac 800K drive (which are faster than Amiga drives). So it can be very fast.

One nice thing about the disk driver is that, even with a 64K ROM system, you always get Mac Plus disk drive speed because the same driver is used for both the 128K and 64K versions of A-MAX. This is great because the disk speed is probably the most noticeable difference between a Mac Plus and an original Mac.

**A+:** Could you elaborate a bit on the three-part disk?

**SD:** What happens is that the Mac drive runs at five different speeds as it goes from track to track. It slows down on the outside of the disk where the track is longer. So it goes from 12 sectors on the outside to eight sectors on the inside. It turns out that the Amiga can read two of the five speeds without difficulty. If you translate this into blocks it's the equivalent of 272K of an 800K disk, or 34 percent.

**A+:** So how does the transfer software work?

**SD:** The transfer software consists of two stand-alone programs—one for running on the Mac and the other for running under A-MAX. There are two types of transfer supported. The simplest one can handle only 272K at a time. Using the Mac transfer program you format a "Mini Transfer Disk" that has a capacity of 272K. Then you exit the transfer program and copy the files you want to transfer onto this disk, as you would normally with the Mac Finder. Once this is done, you run the Mac transfer program again, and click on a button to do the format conversion on the transfer disk. This is all that is required. You can take the transfer disk and put it straight into an Amiga drive when A-MAX is running and the disk will appear as an ordinary

icon under the Finder. No receive program is required for the Mini Transfer Disks and you can just use them as ordinary write-protected disks under A-MAX.

For transferring entire disks these programs support a transfer where an 800K disk is broken up into 272K chunks and placed onto two additional disks. So, you run the Mac transfer program and select the full disk transfer option. The original disk to be transferred is placed in one drive, and the program will request two additional blank disks to be placed in another drive, one after the other. You then take these three disks (the original, plus the two just created) and run the A-MAX disk receiver program, which will read (in an Amiga drive) each of the three in turn and create an A-MAX 800K disk with the transferred programs on it. The process only takes about two or three minutes each on the Mac and the Amiga.

Of course, the easiest way to transfer software is to use the Apple 800K external drive plugged into the A-MAX cartridge and copy files off Mac disks onto A-MAX format floppies. Hopefully, dealers who carry A-MAX will keep an Apple drive around to transfer software across for people who don't wish to buy the extra drive.

### **Hard Disk Support**

**A+:** What about hard disk support?

**SD:** We'll be going for hard disk support in a later version. The problem is the large variety of controllers from the various manufacturers, so one thing we're looking at is the possibility of writing the Mac code interfaces and then leaving the low-level support to a driver written by the manufacturer for their particular controller. This will depend on cooperation from the hard drive companies, so if they have any suggestions we'd be glad to hear from them.

With SCSI controllers we'd like to support the Mac standard partitioning layout, so that a Mac-formatted SCSI drive can be used directly with



A-MAX. This would be a great way to get software across to the Amiga.

**A+:** What about using an existing Amiga SCSI drive and creating a Mac partition?

**SD:** Yes, that will be supported.

**A+:** Will providing support for hard drives be easier than supporting floppies?

**SD:** Yes, in some ways, because it's much more high level. You just tell the controller to read so many blocks at whatever track, into this buffer. So it's the intelligent controller that's doing all the work.

### **Serial & Parallel Ports**

**A+:** What support do you provide for the serial and parallel ports?

**SD:** The Mac has two serial ports and no parallel port, so the A-MAX "serial" drivers can send their output to either the serial or parallel port, selectable by the user.

The A-MAX serial drivers can translate Apple ImageWriter printer control codes into Epson-compatible codes, so people with an ordinary Epson compatible dot-matrix printer can use it with Apple's ImageWriter driver.

For other printers, there's a company called SoftStyle that makes a range of Mac printer drivers for various printers including the HP LaserJet, daisy-wheels, dot-matrix and non-postscript Laser printers.

### **Colors & Interface**

**A+:** Was any of the Amiga hardware an asset in developing the emulator?

**SD:** Yes, the flexibility of the graphics hardware really helped a lot. Just being able to resize the screens so that they are the same size as the Mac's can be really useful. The smooth vertical scrolling was also very easy and fast. Whenever I got tired of working on the disk driver, I would do some work on the video modes. It's so much easier!

With the Amiga graphics hardware we can have lots of different video modes—from 512 X 342 to 640 X 400. Interlace can be turned off in any mode, then the screen can be

smooth scrolled or "flipped" to display the hidden portion of the Mac screen.

Having a really flexible disk controller is what made it possible to use Atari disks and also connect the Mac 800K drive. If the Amiga used a dedicated controller, we would have needed a lot of hardware to be able to use the Mac drive.

**A+:** How does A-MAX work with color and interlace?

**SD:** A-MAX allows the user to adjust the two colors it uses as foreground and background colors. The Mac ROMs we support (64K and 128K) don't support color, so that's the only thing possible in the way of supporting the Amiga's color. The Mac II OS is the only Apple OS with color support.

A-MAX has two non-interlaced video modes, fine scrolling and paging, and also supports the Viking MoniTerm monitor in 1008 X 800 10Hz mode. It is also compatible with the Flicker Fixer board.

### **No Blitter, Some Sound**

**A+:** Does the emulator use the blitter?

**SD:** No, it doesn't use the blitter in the QuickDraw routines yet.

**A+:** What about sound?

**SD:** For sound, we just support the Mac SysBeep function. This is all that the majority of non-game software uses. I looked at the Mac's weird pulse-width encoding that it uses for producing sound from a fixed-length buffer. I tried to find a way to get the Amiga sound DMA to play the data in the background. But because the Mac uses every other byte for the disk speed buffer, it turned out to be incompatible with the Amiga DMA. It may be possible to get more extensive sound support later, but probably not in the first release. The only Mac software that uses a lot of digitized sound are games.

**A+:** Have you tried many games on the emulator?

**SD:** It runs Megaroids and LodeRunner and quite a few others. We haven't bothered testing many, because that's not really what people

will be running. Games usually run only in the Mac 512 X 342 screen size and usually won't work if they are copy-protected.

**A+:** Have you found any Mac programs that don't run yet?

**SD:** The main areas of incompatibility are with copy-protected software and MIDI programs. MIDI programs generally directly access the Mac hardware. So they won't work under A-MAX because, of course, that hardware is not present. Magic Sac had a great deal of difficulty with terminal programs. But a lot of this was due to a problem which A-MAX has a solution for, so serial compatibility is a lot better.

Most other categories of software run very well. There are some special case problems such as early versions of the Mac's Switcher program not running with expansion memory, but compatibility looks to be very good. We are still in the process of testing software (there's a lot around), but we've run HyperCard, Microsoft Word, Excel, MacPaint (all versions), MacWrite (including version 4.5 which won't run on the Mac II or Magic Sac), PageMaker, FullPaint, MacDraw II, LightSpeed Pascal, LightSpeed C, SuperPaint, TMON, and all system disks up to 6.0, without any problems.

**A+:** On a final note, do you have any sense of the availability of Mac ROMs through third-party sources?

**SD:** From what we've heard, it's very good for the 64K ROMs. The 128K ROMs are less common, but they are available from several sources.

**A+:** Thank you very much for talking with AMIGA Plus and good luck with A-MAX!

---

*Ed Bercovitz of Ottawa, Ontario is one of Canada's top Amiga writers and activists. You can contact him online on CompuServe (76314,3340) or PLink (Ed Canuck).*

### **A-MAX**

\$150-\$200

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CIRCLE 211 ON READER SERVICE CARD

PREMIERE ISSUE!

# VIVA:

## *Interactive Video Comes To The Amiga*

DO-IT-YOURSELF

MULTI-MEDIA BREAKTHROUGH

Reviewed by Floyd Steele

**VIVA** (Visually Interfaced Video Authoring) is a software breakthrough for the Amiga—or for *any* type of personal computer. VIVA makes the Amiga a powerful contender in the fast-growing interactive video market. Applications for interactive video technology are surprisingly broad. It is the hottest thing in the training world today—increasingly used in wide areas of both academic education and corporate/industrial training, as well as for automated sales displays such as small kiosks, real estate showrooms, etc. And of course, the original Dragon's Lair laser-disk arcade game was one of the first interactive video programs, with high-quality video pictures that made it an overnight classic.

In "interactive video," events are determined by a user's responses. Consequences of user decisions are seen immediately. Suppose you are a trainee bank teller. A video scene shows a customer coming up and asking a question. Your choices appear at the bottom of the screen. You have just so many seconds to respond, or the computer will choose a situation for you to deal with. You are now actively engaged in a role-

playing simulation that shows you the consequences of your decisions. Interactive video can teach valuable lessons that avoid costly mistakes in the real world.

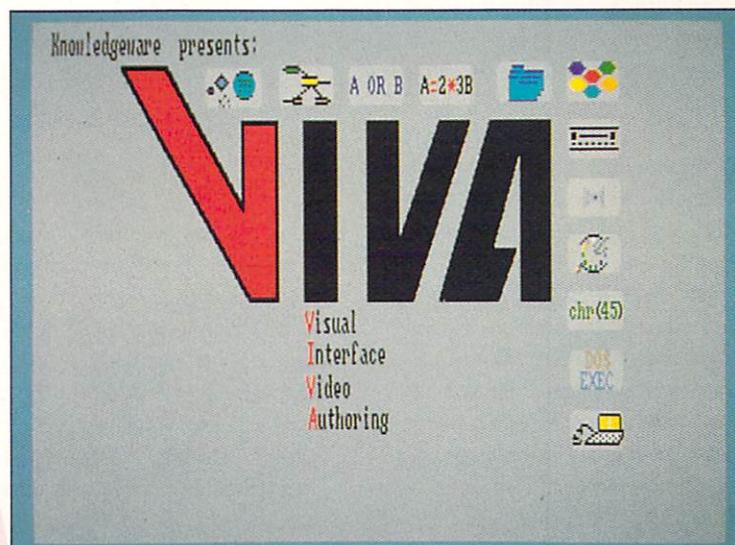
Remember the old saying, "a picture is worth a thousand words." Because of this, training times are being cut by up to 50% and the retention rates are improving dramatically. These are the major reasons that companies are moving in this direction as quickly as they can afford to.

However, because of its very high

cost, interactive video is developing more slowly than companies would like. This is where the Amiga shines. Instead of a single workstation costing \$10,000, VIVA software makes possible the use of Amiga systems that cost under \$4,000 and provide superior graphics—the key to rapid learning.

### **Comdex Champ**

In a seminar at the November 1988 COMDEX computer trade show, an Amiga was running VIVA alongside



the clunky, slow-moving images of a PC and a Macintosh. There was simply no contest!

VIVA comes in several versions. The most basic is VIVA Presents. Retailing at just \$49.95, it contains 18 primary icons for creating demos and simple presentations with video, graphics, and elementary branching. For \$99.95, standard VIVA contains about 100 icons, covering all the scripting groups. VIVA Professional includes all the icon scripting groups—plus record-keeping and artificial intelligence. It retails for \$599.95. The record-keeping creates data-file structure and requires a database program which imports ASCII files. Artificial intelligence is like having a subject-matter expert on disk.

A run-time module is required for each workstation to run all the programs created with VIVA or VIVA Professional. The run-time module has no editing capability and can only execute the program. Affordable site licenses are available for run-time modules.

VIVA has major advantages that will significantly reduce cost and increase effectiveness of interactive video. First, the authoring system is a programming language that's "icon driven." Each icon represents a function such as "play a video segment" or "ask a question." VIVA authors can create presentations in days, that would normally have taken weeks using the current scripting languages. This also means that computer programmers may no longer be required on staff for producing interactive video applications. Therefore, training courses for which industry now pays \$100,000 to \$150,000 can now be significantly reduced in cost, allowing many more workstations for the same dollar. Typically, half of a course cost is video production. And because the Amiga is gaining such rapid acceptance into the video market, the capability of doing more special effects at considerably lower cost is now possible.

Also, graphics can be presented live from the computer, instead of being dumped onto video tape and the

laser disk player—which degrades the quality.

Another advantage of VIVA is that no special cards or adapters are required. This is why Amiga video workstations can be put together for less than \$4,000. The only hardware required beyond the Amiga 2000 is a laser disk player (30 minute CAV format with 54,000 frames and two 30 minute audio tracks), a serial cable and a Commodore 2300 genlock. The 2300 genlock works great because it outputs a broadcast quality RGB overlay signal to the monitor and is very inexpensive.

## Other computers at the COMDEX seminar looked clunky, next to an Amiga running VIVA.

The overlay feature of the genlock is powerful. The computer's excellent graphics can be overlaid on top of the video to highlight important elements and facilitate rapid understanding of the video pictures that may have a lot of information. Also, graphics can be used as menus with "hot spots" (mouse sensitive areas) that can be selected to branch to other areas of the program. This is an excellent example of "hyper-media" technology. A user selects hot spots with a mouse or by touching the screen, to follow an idea thread through the many screens or layers. As you can easily appreciate, systems without a genlock lose impact—such as systems using a monochrome computer screen and a color video screen.

### Cheap Pressing

Each laser disk "pressing" (transfer of video tape to multiple laser disks) costs a minimum of \$2,000 for ap-

proximately 130 copies (at \$15 each). Thus, interactive video uses the disk for video that will not change, blending this with computer graphics for information that does change. The laser disk player can access video segments instantly because the laser read mechanism is a random access device. And the video disk contains *one gigabyte* of information, making it the only computer storage device that can be used for video today.

Laser disk video is normally custom-made for each training course or informational topic. Producing these disks is not technologically difficult. The video production group assembles the video on a 30-minute tape in a sequence determined by the program's instructional design. This broadcast quality tape is then sent to one of the many good laser disk pressing houses in this country or abroad. After the disks are received, frame numbers for each video segment are cataloged. These frame numbers are then noted on the video flow chart symbols.

It is not necessary to start with custom video disk programs. There are some existing disks which can be programmed for interactive use. These off-the-shelf disks cost anywhere from \$50 to \$200 each.

"Repurposing" is the process of taking disks originally intended for use with a hand-held remote device and making them interactive. In order to determine if the existing disks are suitable for repurposing, the disk content should first be reviewed. If it meets your requirements, you should consider using the excellent graphics of the Amiga and the hyper-media features of VIVA. The disks can be made useful for education at low cost. Off-the-shelf courses typically run \$200 to \$1,000 each. Likewise, there are a number of training tapes which have good content that can be made interactive. These are interesting, low cost methods of starting to build your course library.

### Inside Viva

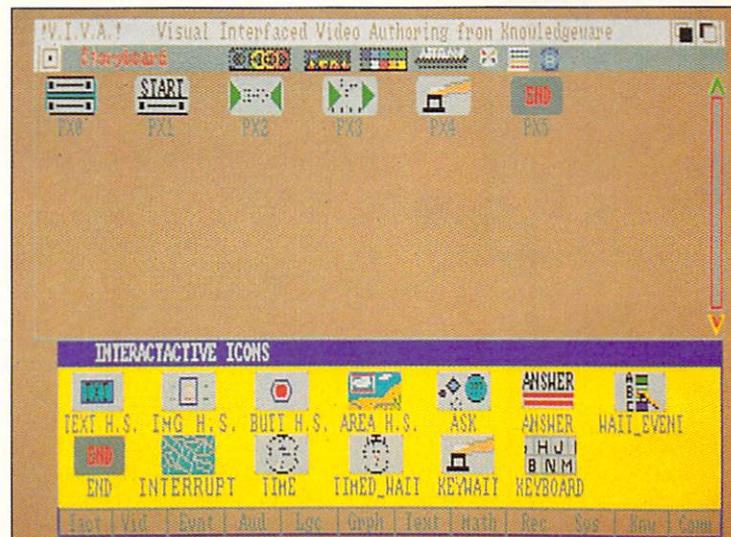
Now, let's turn our attention to the VIVA authoring system itself. VIVA

logo and icon scripting groups are actually used to create interactive video programs. The MAINFRAME is the first screen the author sees after start-up. It enables the author to automatically load the authoring system and review an existing program, or choose to go straight to the authoring language with an empty storyboard and begin creating an interactive video program. The empty storyboard contains the icon scripting groups found in VIVA Professional. The following summary highlights some of the functional icons in each group:

- Interactive (hotspots; questions, timers)
- Video (laser disk commands)
- Events (branching, labeling)
- Audio (digital computer, music)
- Logic (equal to, greater than)
- Graphics (loadpic, showpic, transitions)
- Text (messages, fonts)
- Math (addition, subtraction)
- Records (creates variable files)
- System (chains modules)
- Knowledge (artificial intelligence)
- Communications (configures computer ports)

Let's create a short video segment and illustrate how easy it is to program with VIVA. Click on the VIDEO scripting group. The individual icons could also be accessed by using the menu bar or pressing V on the keyboard. Begin the story scripting by clicking on the SELECT icon. A requester box pops up showing the various Pioneer and Sony laser disk players. Click on the Pioneer 4200. You will now see the first icons appear on the storyboard.

Next, click on START to spin up the laser disk from 0 to 1800 RPMs. The START icon is now on the storyboard. Click on the SEARCH icon. A requester box appears. Since we are dealing with frame numbers, click on FRAME. Click on the frame number box and type in 1000. Click on ACCEPT. Now the SEARCH icon is on the storyboard. Next we will use a



very handy tool to determine the ending frame number. At the top right side of the storyboard window is a blue icon. Clicking on this gadget drops us to the run window and displays a remote control gadget. It allows you to scan the disk forward and backward, search to a frame, or turn the laser disk frame numbers on/off. The gadget is a window, so it can be moved around the screen to facilitate seeing the video.

At this point in our tutorial, click on the frame number display box in

ber 1246 automatically appears in the frame number box. Next click on the INTERACTIVE scripting group (first one) and check on KEY-WAIT, just to illustrate how the program can be paused and restarted by pressing the Esc key. Click on END from the interactive scripting group. Creating this video play program normally takes about 30 seconds.

Run the program by clicking on the gadget just to the left of the laser disk remote control gadget (second from the right). Creating programs this way is intuitive and much quicker than creating lines of text code. There is a full-featured icon editor. Icons can be deleted, inserted, copied, moved, or edited. Editing is used to change the action of an icon. The icon labels on the storyboard can be changed from the serial count number, to a word which describes its true meaning. The icons can be printed in the form of a list. This gives the icon number, name, functional information, and the icon it is linked to. ■

## VIVA puts the Amiga out front in a fast-growing new market.

the remote control gadget. The number 1000 appears. Click on play forward. Let's say the ending frame is coming up. Click on the single framing to stop the play. The frame number is 1246. Okay, we have made a final edit of the material. Go back to the storyboard by pressing the Esc key and double-press the F1 key. Click on the PLAY-TO icon. Click on the word FRAME (for frame numbers, instead of chapters). This time click on QUERY PLAYER. The frame num-

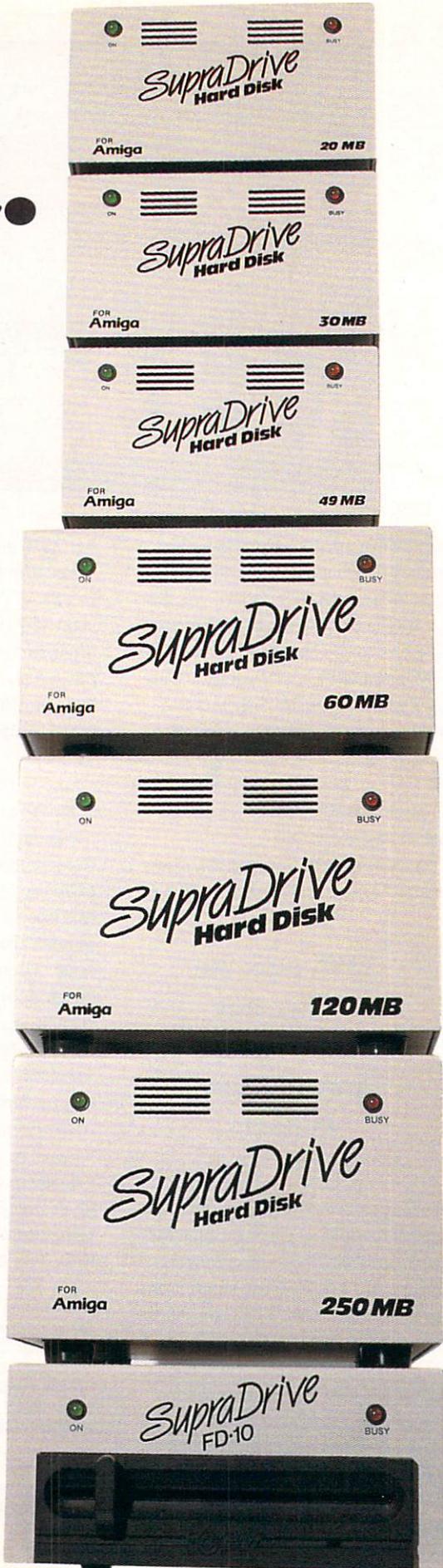
*VIVA was created by programmer Paul Benson and applications designer Fern Tompkins Benson of Knowledgeware in Paso Robles, California. It is distributed by MichFron, 576 S. Telegraph, Pontiac, MI 48053. (313) 334-5700.*

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*Floyd Steele is a Charleston, West Virginia video training consultant who put in hundreds of hours helping to beta-test VIVA.*

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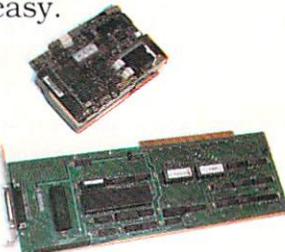
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# Cracking The Amiga Shell

***Powerful new features in CLI's replacement***

BY ARNIE CACHELIN  
AMIGA Plus Technical Editor

Quite a few Amiga users avoid the AmigaDOS interface. They try to operate their computers as much as possible through the menus and icons of the Workbench.

Sure, the Amiga Command Line Interface (CLI) has a primitive style. It forces you to backspace to your typo, re-type many nearly identical lines, type "execute" before every script file you run, and memorize lengthy lists of commands and syntax similar but not quite identical to MS-DOS and UNIX. But the CLI offers you power, speed, and efficiency far beyond the scope of Intuition.

Now Workbench 1.3 brings you the Amiga Shell, which offers all the benefits of the CLI while removing—or at least reducing considerably—these problems.

Amiga Shell users can still replace the series of mouse clicks and drawer openings needed to run a program with a line or two of type. They can still start a program with command line arguments to load exactly the picture, document, or project they want to work on, without waiting for the program's "load" requester (if there is one) and without running info from the Workbench to set the

**The Amiga  
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intuitive input  
style.**

icon's default tool. Thus Shell users gain speed and efficiency because their fingers never leave the keyboard and their disks don't become filled with icon.info files. Yet these speed gains pale in comparison to the real *raison d'être* of the Shell—its raw power.

## **AmigaDOS Access**

Like its predecessor the CLI, the Shell offers access to the AmigaDOS commands which allow you to view or delete directories and their contents, even if they don't have icons. If listing and creating directories, copy-

ing, renaming, and deleting files doesn't excite you, think of copying your memos to the printer or the speak: device. Imagine the joy of redirecting the output of a directory listing to prt: or to speak: or to a file or even to the limbo of lost output, nil:. I/O redirection with its symbolic little arrows (< and >, and even >>) is great, but wait, there's more!

With only one command, you can use the AmigaDOS pattern of matching "wildcard" symbols to operate on a whole horde of files connected by only a few similarities in their names! For those of you who don't happen to have your AmigaDOS manual handy, a summary of the Amiga's wildcard symbols follows:

- ? — Matches any single character
- # — Allows any number of the pattern that follows
- % — Matches the 'null' string (no characters)
- ( ) — Group a pattern into a single unit
- | — Connects alternative patterns (OR)
- ' — Encloses literal characters

Some examples of patterns will be helpful here. Typing "LIST #?" will list all files. Using "LIST (#?.doc)(#?.txt)" will list all files ending with either ".doc" OR ".txt". This is the same as "LIST #?((.doc)(.txt))". "DELETE #?.info" will delete all the files ending with ".info" (icons). "LIST ???" will list files with 2 characters while "LIST #??" will list files whose names are a bunch of question marks (i.e. ??? and ?????).

### **Exotic I/O**

I/O redirection sounds rather exotic, but is actually quite simple. Following any command with a < (an arrow into the command) immediately followed by a filename will tell that command to look for its arguments or input in the file specified. Similarly, a command followed by >filename will send its output to the specified filename. These files can be actual disk files like "ram:listing" or logical devices like prt:, ser:, or nil:. As an example, typing "LIST >prt: dfl:" will list the contents of dfl: to the printer. "ENDCLI >nil:" will end your CLI or Shell and send its little message to nowhere. "DELETE >ram:DeletedFiles Utilities/#?" will delete all the files in the directory Utilities and send the messages about which files were deleted to the file ram:DeletedFiles. The Shell in the 1.3

release has added the >> redirection operator which appends the output onto an existing file rather than overwriting it. This will be discussed soon.

When a shell is started by typing "NEWSHELL", a command window opens and the file s:Shell-Startup is executed. This is the default script

## **Redirect the output of a directory listing to prt: or speak:, to a file or even to the limbo of lost output, nil:**

file for the shell. It can be replaced by using the FROM argument with NEWSHELL (i.e. "NEWSHELL FROM dfl:AlternateScript"). The standard Shell-Startup script on Workbench 1.3 sets the prompt to display the task number of your shell and the current directory. It also defines a few ALIASes (more on this later). After this file has been executed, the user is faced with a new, empty

window and a prompt like "1.Workbench1.3>" waiting for a command. If you type a command, it will work just like the 1.2 CLI window. The fun starts when you miss-type a command. With the CLI, you must backspace to the error, then re-type the whole command from the point of the error. While this is minor if you type "LISR" rather than "LIST", it becomes quite a pain if you typed "LISR dfl:fonts/helvetica". The shell, or more specifically the newcon: device, will allow you to use the cursor keys to edit your command line. This saves a lot of retyping! Combined with the other enhancements provided by newcon: this feature can perform miraculous feats.

### **CLI Editing**

Command line editing can be accomplished with the cursor (arrow) keys or with Control key combinations (listed below) as well as the Backspace and Delete keys. Another feature of the Shell is the command history buffer. This is a 2K buffer that remembers what commands have been entered. By using the Up and Down Arrow keys or the appropriate Control keys, you can scroll through the past 2K (quite a few) worth of lines you have input. By changing just a few characters in a previously typed line, you can save much time and typing. One of my favorites is the line "FORMAT DRIVE dfl: NAME Blank NOICONS" which can be quite a mouthful, particularly when you have a new box of 10 disks. This line now is retyped for you with a single keystroke. If you have typed many lines since your last format, and you find another new disk, you can type a partial command line like "for" and then use the Shift Up-Arrow keys (abbreviated as s-up) to search the history buffer for a line beginning with for. Most of these features can be accessed either with the Arrow keys, or by holding the Control key and typing another key (Control-X would be abbreviated ^ X). A list of these commands is presented in *Figure 1*.

Key	Alternate	Function
left	—	move left
right	—	move right
s-left	^A	move to beginning of line
s-right	^Z	move to end of line
^K	—	erase from cursor to end of line
^U	—	erase from cursor to start of line
^W	—	move to next tab
^X	—	erase entire line
up	—	scroll history backwards
down	—	scroll history forwards
s-down	^B	move to bottom of history buffer
s-up	^R	search buffer for partial command

**Figure 1**

Another edge that the Shell has gained over the CLI is the use of the new file protection flag "s" which, when set, shows the shell that the file is a script. With the CLI, one had to type "EXECUTE MyScript" to execute the series of commands in the file MyScript. Using the shell, one can achieve the same result by simply typing "MyScript". In order to set the script bit for this file, use "PROTECT MyScript +s". Although preceding your scripts with EXECUTE is not that difficult, the ability to run scripts and commands with the same syntax (without even having the MS-DOS extension ".bat" to ignore) makes your system very flexible indeed. Some examples of scripts are the "commands" SPAT, DPAT, and PCD supplied by Commodore in the S directory of the Workbench 1.3 disk. They are used to provide wildcard matching capability for commands which don't already support it (SPAT for single arguments, DPAT for double arguments), and to CD back to your previous current directory.

### **Enhanced Output**

The enhanced output redirection available to Shell users completes the traditional set of UNIX I/O redirection operators. Following any command by >>filename will append the output of the command to the file called filename. Unfortunately, filename must already exist, otherwise an error occurs. This file can, of course, be created using the normal output redirection operator >. As an example, type the following lines to make a file with a catalog of all your disks:

```
DATE >ram:catalog  
INFO >>ram:catalog DF1:  
DIR >>ram:catalog DF1: ALL
```

Now tap the Up-Arrow until the INFO line reappears, insert your next disk into df1:, press Return, scroll up to the DIR line, press Return and then repeat these steps with the next disk. What has happened is this: the line DATE >ram:catalog created the file ram:catalog and wrote the date and

time into it. The next line appended the INFO output about df1: to ram:catalog. Finally, we added a directory listing of the files on df1: to ram:catalog. Without using any keys other than the Up-Arrow and Return, we can catalog all the disks in our collection! You can now try "TYPE >prt: ram:catalog" to get a printout of the catalog. Of course you could have used prt: instead of ram:catalog in the first place, but there may be some use in having a file with the contents of your disks.

### **Super Alias**

Perhaps the most useful new feature of the Amiga Shell is the ALIAS command. This command allows

## **Perhaps the most useful new feature of the Amiga Shell is the ALIAS command.**

users to customize their commands by substituting a string entered at the command line with a previously defined string. Thus an MS-DOS user can type DEL for DELETE without actually renaming the command DELETE on the disk. Although renaming the actual command works fine, it causes problems when you execute a script file which expects to be able to DELETE a file. Problems also occur when someone new tries to use the command DELETE. Using ALIAS avoids these problems by allowing the shell to recognize both DEL and DELETE—as well as other alternate names for DELETE like RMDIR, RD, and BAG. ALIAS can also save a lot of typing as in "ALIAS fm format drive df1: name BlankDisk." And there's more!

Using ALIAS, you can sneak RUN in front of your commands as in "ALIAS ed RUN ED []" or attach your favorite flags to commands such

as "ALIAS ls LIST LFORMAT "I found %s!!" []". The [] symbols reserve a place for a command line argument. The best way to learn about using ALIAS is to examine some examples and to experiment on your own. A few more details you should know before we get too far into the examples: Typing ALIAS all by itself will list the current aliases in effect, and typing "ALIAS ls" will un-define the alias 'ls'. Below and on the AMIGA Plus disk, you will find a list of some aliases ranging from very handy to rather silly. To have these aliases go into effect automatically whenever you open a shell, copy the lines desired into the file s:shell-startup using a text editor, or just rename the file AmigaPLUS.alias to s:shell-startup.

This is the original shell-startup file provided by Commodore:

```
Prompt "%N.%S>"  
ALIAS xcopy copy [] clone  
ALIAS endshell endcli  
ALIAS pro execute s:spat protect []  
ALIAS sdate execute s:spat  
setdate []  
ALIAS ren execute s:dpat  
rename []  
ALIAS clear echo "*E[0;OH *E[J]"  
ALIAS reverse echo  
" *E[0;OH *E[41;30m *E[J]"  
ALIAS normal echo  
" *E[0;OH *E[40;31m *E[J]"
```

The last three lines send escape sequences to the shell window to alter the text colors. The characters "\*E" are equivalent to the escape character (ASCII number 27). Other escape codes can be used to produce interesting results, as we shall soon see. Below are a few custom aliases which may be useful.

```
Prompt "%N-%S>"  
ALIAS clone copy [] clone  
ALIAS end endcli  
ALIAS ls list  
ALIAS cls echo "*E[0;OH *E[J]"  
ALIAS del delete []  
ALIAS x execute []  
ALIAS ed run ed []  
ALIAS md makedir  
ALIAS ass assign
```

ALIAS fm format DRIVE df1:  
     NAME blank NOICONS  
 ALIAS sys cd sys:  
 ALIAS res resident []  
 ALIAS c: cd c:  
 ALIAS s: cd s:  
 ALIAS fonts: cd fonts:  
 ALIAS devs: cd devs:  
 ALIAS libs: cd libs:  
 ALIAS ram: cd ram:  
 ALIAS rad: cd vd0:  
 ALIAS vd0: cd vd0:  
 ALIAS df1: cd df1:  
 ALIAS 3: cd df3:  
 ALIAS 2: cd df2:  
 ALIAS 1: cd df1:  
 ALIAS df0: cd df0:  
 ALIAS 0: cd df0:  
 ALIAS : cd :  
 ALIAS / cd /  
 ALIAS read more  
 ALIAS shell newshell  
     newcon:0/10/625/180/Shell  
 ALIAS IBM newshell  
     newcon:0/10/625/180/  
         IBM\_Shell FROM S:MSDOS  
 ALIAS hear run list >speak: quick  
 ALIAS hex type [] opt h  
 ALIAS unpro protect [] +d  
 ALIAS dpro protect [] -d  
 ALIAS hide protect [] +h  
 ALIAS spro protect [] +s  
 ALIAS Bold echo “\*e[1m\*eM”  
 ALIAS Plain echo “\*e[0m\*eM”  
 ALIAS Italic echo “\*e[3m\*eM”  
 ALIAS Underline echo  
     “\*e[4m\*eM”  
 ALIAS FgColor0 echo  
     “\*e[30m\*eM”  
 ALIAS FgColor1 echo  
     “\*e[31m\*eM”  
 ALIAS FgColor2 echo  
     “\*e[32m\*eM”  
 ALIAS FgColor3 echo  
     “\*e[33m\*eM”  
 ALIAS BgColor0 echo  
     “\*e[40m\*eM”  
 ALIAS BgColor1 echo  
     “\*e[41m\*eM”  
 ALIAS BgColor2 echo  
     “\*e[42m\*eM”  
 ALIAS BgColor3 echo  
     “\*e[43m\*eM”  
 ALIAS Inverse echo “\*e[7m\*eM”

The last 13 aliases above give further examples of using ANSI printer

codes to alter the type style of your console window. The <esc>M at the end of each one does a reverse linefeed so that no blank line is output by the ECHO command. The inverse command just highlights each printed character rather than swapping the foreground and background colors, then doing a screen clear (as the reverse alias does). If you want to use the IBM alias to open a shell which will act almost like an IBM-PC for many of the simple DOS commands, the NEWSHELL command must be able to find the file s:MSDOS.

## The ALIAS command allows users to customize their commands without actually renaming the commands on the disk.

This file contains the aliases to mimic MS-DOS as closely as possible. Further steps to match the IBM commands and syntax will be discussed shortly. The aliases in the file MSDOS on the AMIGA Plus disk are:

ALIAS xcopy copy [] clone all  
 ALIAS ren execute s:dpat  
     rename []  
 ALIAS mkdir makedir  
 ALIAS md makedir  
 ALIAS format format DRIVE []  
     NAME BlankDisk  
     NOICONS  
 ALIAS edlin run ed []  
 ALIAS print type >prt: []  
 ALIAS del delete []  
 ALIAS erase delete []  
 ALIAS era delete []  
 ALIAS rd delete []  
 ALIAS rmdir delete []  
 ALIAS dir dir [] all

ALIAS chdir	cd
ALIAS append	path [] add
ALIAS time	date
ALIAS :	cd :
ALIAS \	cd /
ALIAS A	cd df0:
ALIAS B	cd df1:
ALIAS C	cd dh0:
ALIAS tree	dir
ALIAS set	setenv
ALIAS ver	version
ALIAS label	relabel

While this set of aliases will save a bit of confusion for those of you who are used to using MS-DOS, there will be many times when this hybrid command set will just not work as expected. A major difference is in the volume names. Although typing "A" will CD to the internal disk drive, the volume is still df0:. A classy solution to this is to change the devs:mountlist file to mount the disk drives as A and B rather than df0: and df1:. This is analogous to mounting a hard disk partition as C: (or dh2: or FF2: etc.). The real solution is to get used to the Amiga volume names! Another problem stems from those pesky directory separators. If Microsoft had followed the UNIX convention of using a slash (/) to separate directories from subdirectories rather than a backslash (\), much confusion would have been avoided.

Finally, the use of an asterisk for a wildcard symbol is nearly ubiquitous. Here the Amiga is to blame; they use the asterisk to denote the console window I/O stream. It is little consolation that the ? symbol has the same single character matching function in both AmigaDOS and MS-DOS. If there are MS-DOS commands not included among these aliases that you can't live without, chances are that a well conceived script file can do the trick. Look for tips on creating these scripts in future issues of AMIGA Plus. ■

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CIRCLE 235 ON READER SERVICE CARD



# AMIGA Plus 1988

## Federal Income Tax

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BY MICHAEL BROWN AND TOM CHANDLER

Take the drudgery out of calculating your 1988 Federal Income Tax returns! Use Amiga spreadsheet power to effortlessly explore every possible tax strategy that might lower your annual payoff to Uncle Sam.

This special AMIGA Plus Disk Bonus—for all taxpayers who file IRS Form 1040 and itemize their deductions—requires an Amiga with at least 1 megabyte of memory. The tax template works with the best-selling Amiga spreadsheet **MaxiPlan** (recently renamed **Plan/IT** and now published by B.E.S.T.).

The AMIGA Plus tax template consists of five different spreadsheet modules linked together. Each module corresponds to one of the most common Internal Revenue Service forms or schedules:

**Form 1040** U.S. Individual Income Tax Return

**Schedule A** Itemized Deductions

**Schedule B** Interest & Dividend Income

**Schedule E** Supplemental Income Schedule

**Form 2106** Employee Business Expenses

This article assumes that you already know how to operate MaxiPlan (Plan/IT). You don't need to be an expert in order to use the template, because all required formulas are already set up in the disk file. However,

#### Spreadsheet formulas eliminate the tedium of carrying forward and combining information from one form to another.

if you have never used a spreadsheet in your life, please spend enough time practicing with the MaxiPlan manual and tutorials so that you can handle the tax template without undue aggravation. And do use common sense in . . .

#### Getting Started

Each simulated tax form or schedule is sized so that the complete width of each form can be displayed on the screen, and a click on the horizontal scroll bar brings the next form into view. After all necessary information has been typed into the spreadsheet and calculated, you can print the template and copy your results onto the appropriate IRS forms. Please note that the tax template does not produce facsimile forms acceptable to the IRS.

Spreadsheet formulas eliminate the tedium of carrying forward and combining information from one form to another. You need only type the appropriate information once—income, expenses, tax payments, etc.—and the computer calculates totals, percentages and other computations. The template recalculates whenever you press the F1 key. (In order to speed up the data entry process, MaxiPlan has been set to manual calculation mode.) The template should be recalculated in it. In order to prevent the possibility of accidentally damaging the template, all cells containing formulas, labels and

titles have been "protected."

The MaxiPlan (Plan/IT) eight-color screen display is used to color-code various elements of the template. Titles of forms and schedules are displayed in bright red, section titles are displayed in blue, and other divisions of forms and schedules are displayed in yellow. Line numbers corresponding to those on the IRS forms and schedules are displayed in dark red. Text appears in black, which can be called up with the HELP key to display additional information.

Completing the template is relatively self-explanatory, but you should keep a copy of the IRS instruction booklet and forms handy while you enter the information. Fill out the template according to the instructions in the IRS booklet. Here's some extra help with specific forms and schedules in the template:

### Form 1040

If you had less than \$400 in taxable interest income, enter that amount on line 8a (Cell E22). If you had more than \$400 in taxable interest income, you need to complete the template for SCHEDULE B—Interest and Dividend Income. Total taxable interest income from that schedule will be rolled forward into line 8b (Cell E23). If you enter more than \$400 in interest income on line 8a, an ERROR message will appear on line 8b. Simi-

lar conditions apply to taxable dividend income reported on line 9.

Income from rents and royalties, reported on line 18, will be plugged into Cell E35 from the Schedule E template. Total itemized deductions, reported on line 34, will be plugged into Cell E56 from the Schedule A template.

Your taxable income will be calculated and displayed on line 37 (Cell E59). Enter your payable income tax (from the schedules in the IRS booklet) in lines 38 & 39 (Cells E60 & E61), any tax credits in lines 41-45 (Cells E64-E68), and any additional taxes in lines 48-52 (Cells E72-E76). Enter your tax payments in lines 54-60 (Cells E79-E85).

After recalculating the spreadsheet, any overpayment of taxes will be displayed on line 62 (Cell E88). Enter the amount of the overpayment you wish to have refunded to you on line 63 (Cell E89). After recalculating the spreadsheet, any remaining balance will be carried to line 64 (Cell E90), indicating the amount of your overpayment that you wish to have applied to your estimated 1989 tax. Any additional taxes you may owe will be calculated and displayed on line 65 (Cell E91).

### Schedule A

Enter your itemized deductions into this template as indicated. All to-

tals and percentages will be computed when the F1 key is depressed. If you are claiming a deduction for non-reimbursed Job Expenses, the

You only enter  
your  
information  
once and the  
computer  
calculates the  
totals and  
percentages for  
you.

template assumes you will complete Form 2106, so the total from that form will be carried forward. If you are not required to file Form 2106, override the protection on this cell and enter your expenses.

### Schedule E

If you receive supplemental income from rents, royalties, etc., complete the template for IRS Schedule E. Due to the new IRS regulations regarding deductions for losses from rental income property, it is impossible to make assumptions within the template as to how those losses should be recorded in Schedule E, line 23 and line 24. This makes it necessary to compute the values outside of the spreadsheet and plug them into cells I44-K44 and cells I48-K48. All other calculations will be performed by the template and carried forward to Form 1040. ■

Schedule E - Supplemental Income Schedule (From Rents, royalties, partnerships, etc.)				
Part I - Rental & Royalty Income or Loss				
Properties				
Rent & Royalty Income	A	B	C	Totals
Rents Received	0.00	0.00	0.00	0.00
Royalties Received	0.00	0.00	0.00	0.00
Rent & Royalty Expenses				
Advertising.....				
Auto & travel.....				
Cleaning & maintenance.....				
Commissions.....				

### Schedule E

PLAN/IT \$149.95  
B.E.S.T., Inc., 11525 SW Durham Road,  
Tigard, OR 97224. (503) 684-6655,  
(800) 223-6655 (orders only).  
CIRCLE 215 ON READER SERVICE CARD

Michael Brown, who wrote the Amiga article and template conversion, is a finance professional and a widely published Amiga author/reviewer. Tom Chandler, who programmed the original template, is an accounting professional.

# Commodore A2620 Accelerator Board

PLUG IN 68020 POWER—RUN YOUR AMIGA 2000

FIVE TIMES FASTER

Reviewed by Jez San

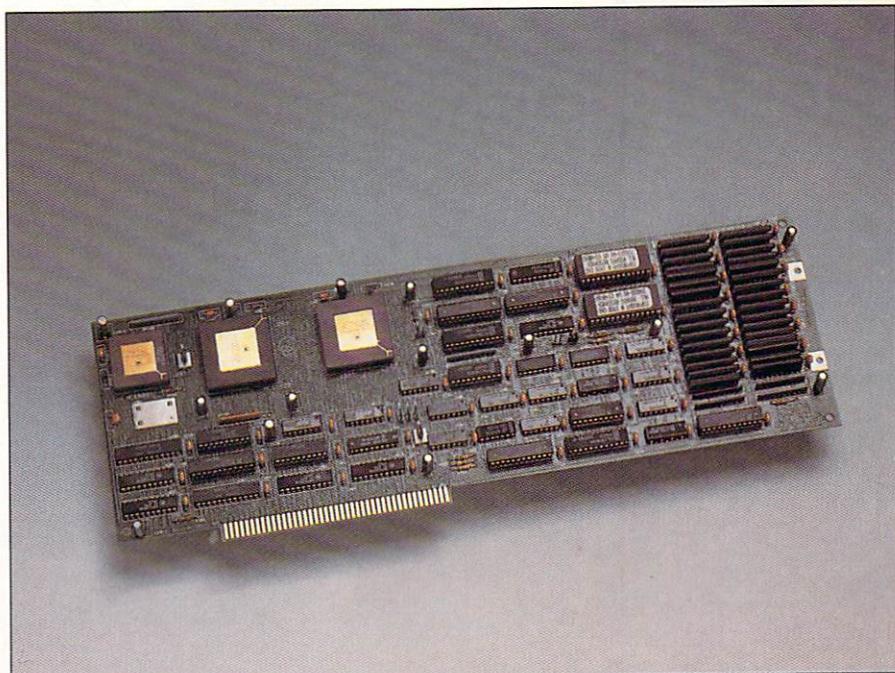
The Commodore A2620 is a neat, densely packed expansion card that plugs into the Co-Processor socket in an Amiga 2000. Installation is deceptively simple. Don't even bother reading the manual, unless you need to be told where to plug the card into the only conceivable socket it could even remotely fit into on the whole computer! Power up, and if all goes well you should be welcomed by that familiar left hand holding that familiar disk. Say, why is that guy left handed anyway? (The artist who drew it was right handed, copying his left hand holding the disk, so they say.)

By holding both mouse buttons down with your right hand, and pressing various other pointy-parts of your anatomy on CTRL-AMIGA-AMIGA you get a menu of three configurations. You can either boot into a vanilla AmigaDOS 68000, super-dooza AmigaDOS 68020, or even 68020 UNIX—though the UNIX requires a frighteningly expensive Quantum 80 megabyte hard disk laden with goodies before it'll work very well. If you don't bother holding down your mouse-buttons on

startup, the computer will default to AmigaDOS 68020, unless you have been playing with your jumper switches on the main board!

The A2620 board comes in its minimum configuration with a 14.3

mHz 68020, 2 megabytes of fast 32-bit RAM (100 nanoseconds), a 14.3 mHz 68881 (that's a math co-processor to you and me) and a 14.3 mHz 68851. The latter chip is an MMU (Memory Management Unit).



A2620 68020 Processor Board—The A2620 combines a 14.3 MHz 68020 microprocessor; a 14.3 MHz math co-processor; and a Memory Management Unit together with 2 MB of 32-bit RAM dramatically improving performance while maintaining compatibility with existing Amiga software.

# zo·ë·trope (zō'ə trōp)

*n.* [irreg. f. Gr. zoe-, life + tropos, turning] 1. a device that gave static images an illusion of motion. Known as the "wheel of life", the zoetrope brought the magic of animation to the parlours of the mid-1800's. 2. a new state-of-the-art advanced animation system for the Amiga® computer from Antic Software.

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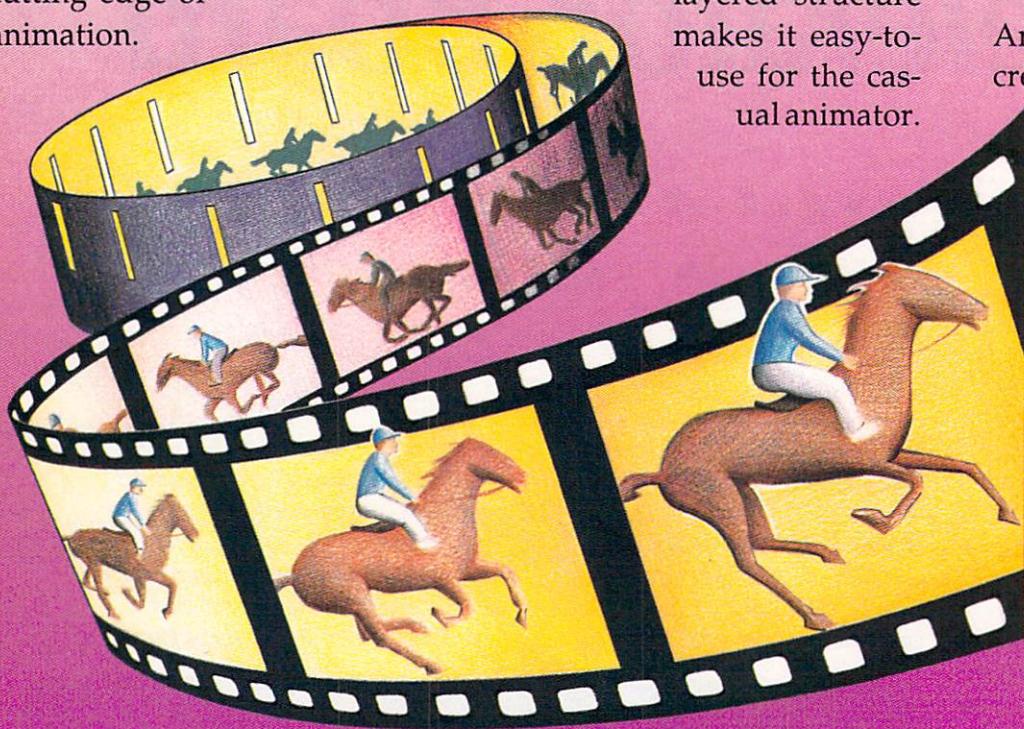
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Bring your imagination to life with Zoetrope: the faster way to animate.

Now with Zoetrope, The Animation System™, you can create magical motion.

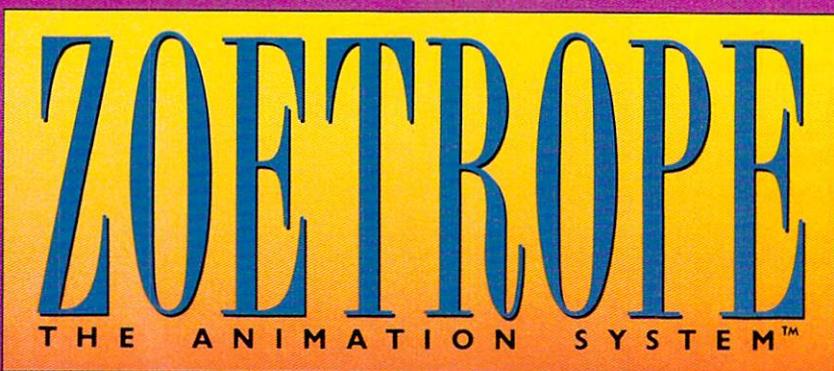
Here are just a few of Zoetrope's exciting, advanced features:

- Spin and swoop titles and images through 3D space.
- Apply computer power to classic "cel" animation.
- Overlay and underlay (compositing) your favorite pictures or animations.



## Taking animation into the 21st Century

By Jim Kent, the creator of Aegis Animator™



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MM8AW3

CIRCLE 002 ON READER SERVICE CARD

These babies perform virtual memory and address translation tricks required by UNIX and other high-power Operating Systems. If your 68020 card hasn't got an MMU, then you can't run UNIX. I think an MMU is the way to go, which is just as well, since Motorola has built one onto the 68030 chip, which we'll all be using as standard in a few years time.

The 68020, being a 32-bit chip, isn't being run at full tilt unless it finds 32-bit RAM. Some of the cheaper 68020 cards that lack this are not going to offer significant speedups. The Commodore's A2620 runs its clock at twice the standard speed of an Amiga—making it twice as fast. But with the 32-bit RAM and sophisticated cache inside a 68020, this ends up quadrupling the speed of a standard Amiga. For mathematical applications this will be even better, as the 68881 can do some things at 10 or 20 times the speed that the normal Amiga math routines can manage. And if you use Workbench 1.3 the improvements will often be transparent, without requiring any new software patches.

To set up a CSA 68020 card with the equivalent features and functions of the Commodore A2620 would not only cost three or four times as much, but CSA lacks an MMU, making it ideal for UNIX-haters, but lousy for everyone else in the world. And seeing as how Commodore's UNIX is apparently something fine to behold it would be short-sighted not to have the chance of running UNIX in a year or two's time. Commodore's 32-bit RAM is autoconfigured to reside in the system's 24-bit address range. What that means in layman's terms is that it will work with existing hardware devices like DMA hard disk controllers and video boards. CSA had this idea of putting their 32-bit RAM out of the Amiga's accessible address range, with a series of trick ribbon cables running on top of their board. It basically means you are limited in what hardware works on a CSA-equipped Amiga, whereas Commodore's board ought to run everything. The A2620 design is flawless.

The Public Domain benchmark SI (written by Pregnant Badger Software) claims that both the CSA 68020 and Commodore's 68020 run at 4.5 to 4.8 times the speed of a standard Amiga. They also claim that equates to 15 times the speed of an IBM PC, though I'd argue how they worked that one out. My guess is more, say, 20 times. But we've all heard "There's Lies, Damned Lies, and Benchmarks." I tried a few of my own kludged-together benchmarks. Like putting individual 68000 instructions in a tight loop and seeing their relative performance compared to a normal

unexpectedly fast, and causing timing-loops to give incorrect values. The people who issue these games will no doubt offer new versions that will be less timing-sensitive. While it's not hard to make sure a game runs on a 68020, before the boards were available it was hard to test if everything was okay. The good thing about the Commodore card is that if you ever find a program that doesn't run on it, you simply do the five fingered salute (both mouse buttons, and the normal three fingered one), and you can then boot into a 68000, minus the 68020 and 32 bit RAM. That way, it is very effective in bridging the temporary compatibility gap with some games, though with business or productivity applications there should be no compatibility woes. I had far more hassle trying to get a CMI Processor Accelerator to work with my system. It worked fine until I wanted to plug my hard disk back in, or in fact any card on the bus. But friends who have bought newer CMI boards have not had these problems.

At this writing, Commodore had started shipping A2620 cards in small numbers to dealers and developers, meanwhile they were already selling a pilot production run of the new Amiga A2500, which is really a repackaging job of an A2000, with an A2620 card carrying two megabytes of RAM, plus a decent 40 megabyte hard disk. Sounds like a winner, especially in price per performance compared to a Mac II. Good luck Commodore, keep pushing the performance stakes higher! Next trick, a 33 mHz 68030!?? ■

## With real-world programs like Assemblers and Compilers the difference in speed is staggering.

Amiga. In most cases, my tests proved the figure of four to five times the speedup. With real world programs like Assemblers and Compilers the difference is staggering. Ignoring the unchanged disk performance, most programs show a three or four times speed improvement overall. Even programs that run solely from chip memory like our own Starglider II show significant improvements, although only about two or three fold. Compared to cheaper speedup boards, like the CMI Processor-Accelerator, this thing really flies. But then, you get what you pay for. After all, the Processor Accelerator is a seventh of the price. Trouble is, for most programs, the Processor Accelerator only speeds them up 20 or 30%—a tenth of the speedup gained from using a CBM A2620 card.

During my one-month testing of the CBM A2620, I found that most programs would run perfectly on it. Some self-booting games may suffer problems due to the Amiga running

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**COMMODORE A2620** \$1,999  
Commodore Business Machines, 1200 Wilson Drive, West Chester, PA 19380. (215) 436-4200.

CIRCLE 214 ON READER SERVICE CARD

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*Jez San heads England's Argonaut Software, developers of the bestselling Starglider game series. This review is simultaneously appearing in the British magazine, Amiga Computing.*

# **HiSoft BASIC Professional**

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**HiSoft BASIC Professional™**, a fully integrated compiler, is the fastest BASIC available for the Amiga. Convert all your AmigaBASIC™ programs into fast running machine code quickly and easily. **HiSoft BASIC Professional** is 100% AmigaBASIC compatible and is also compatible with Microsoft QuickBASIC 3™.

	HiSoft Professional™	AC BASIC™
SIEVE		
Compile time (secs)	7	20
File size (bytes)	868	2228
Run time (secs)	1.0	2.7
CALC		
Run time	1.6	4.9
BSPREAD		
Compile time	55	80
File Size	35816	56036

### **Comparison of typical HiSoft BASIC and AC BASIC benchmarks and functions.**

AmigaBASIC is one of the best implementations of BASIC available on any microcomputer. **HiSoft BASIC Professional** produces stand alone programs which execute faster than possible with AmigaBASIC, or any other BASIC Compiler.

**HiSoft BASIC Professional** takes an already good language, extends it, and makes it even better. **HiSoft BASIC Professional** includes full MENU support, with event trapping and powerful sprite routines, using the OBJECT keywords.

Full support of the Amiga is included with extensive window, screen, and graphic commands. Amiga libraries can be accessed as if they were built-in statements.

### **Features of HiSoft BASIC Professional:**

- ▲ Compatible with Microsoft QuickBASIC 3 on the PC AmigaBASIC, Atari ST BASIC and most other BASICS.
- ▲ Full structured programming with long IF's, multi-line functions, sub-programs, CASE, REPEAT, DO, etc.
- ▲ Compiler and run time options permitting tremendous flexibility while compiling and executing.
- ▲ Compiles directly to memory, or to your disk.

- ▲ Full recursion in sub-programs and functions plus local and global variables, arrays as parameters.
- ▲ Compiled programs can execute from their own windows, or can use the CLI window for minimum size.
- ▲ The only limits to **HiSoft BASIC Professional** are the memory of your computer and your imagination.
- ▲ String variables may be up to 16 Megabytes long (memory permitting).

**HiSoft BASIC Professional** is a no-limits language; string variables may be up to 16Mbytes in length and there are no limits on array sizes either (subject to available memory). Code generated is fully 68010/020/030 compatible.

"To describe HiSoft's offering as just another Amiga BASIC compiler with a few extras wouldn't be doing the product justice....Hisoft has extended the language, adding a whole range of extra features while still managing to retain complete compatibility with AmigaBASIC."...Jason Holborn, a veteran Amiga programmer and repeated reviewer.

The **HiSoft BASIC Professional** manual is clearly written and informative. *New Computer Express* hailed it as "An example of how a computer manual should be written. Whether you're a complete beginner or a seasoned Techie, the **HiSoft BASIC Professional** manual contains all the information you will require, organized in a clear and logical manner."

### **What people are saying about the HiSoft BASIC Professional package.**

**HiSoft BASIC Professional** is available for all Commodore Amigas. Retail price is \$159.95. See your local dealer today!



# View From A Brit

## *Report on the European Amiga scene*

BY SIMON ROCKMAN  
Editor of Amiga Computing

Great Britain is an odd place to own an Amiga. We have the highest number of home computers per head in the world, but most of these are Commodore 64s and Z80-based Sinclair Spectrums. Most software is sold on cassette and a good proportion of games sell for under \$5.

So while lots of us have computers, we don't spend much money on them. The Atari ST is selling very well. It is \$160 cheaper than the A500 and outnumbers the Amiga by around three to one—although the gap is closing.

The strength of the home computer market means that there are hundreds of programmers and a number of US companies have set up here. The best established is MediaGenic. They have a large development program with some amazingly good products in beta test. **Super Hang On**, a conversion of the Sega arcade game, looks and plays just like the real thing. The programmer, ZZKJ, was part of the team which produced the Z80 versions and was then commissioned to write the game for the Atari. He was not asked to code an Amiga version, but did so anyway to practice with the machine. The results were so good that Software Studios, a division of Electric Dreams, which is part of Activision Europe (confused?—I know I am), agreed to

commission better graphics and sound. The result is the best arcade conversion on the Amiga.

### **Games Galore**

Britain is not only good at fast-shooty games. Telecomsoft is a division of British Telecom—the people who run the telephone system here, our Ma Bell or AT&T. Under the Rainbird name they produce top-notch Amiga software. You will have seen games like **Starglider II**, programmed by Argonaut; **Fish**, by Magnetic Scrolls; and Realtime's **Carrier Command**. The latest release, **Weird Dreams**, is really odd, a tale of a man who has been given some strange pills by a demon and has the oddest of nightmares. The aim is to wake up. It's seriously different with great graphics.

Realtime is now working on a game called **Vectrace** where you fly a small craft around a maze. They say it won't be as complicated as Carrier Command. Magnetic Scrolls is rumoured to be working on non-adventure titles, which include a Lego-style construction game (code-named **The Toy**). The company has also dropped hints of a flight simulator.

Argonaut is currently working on a flight simulator codenamed **Hawk**, to be launched by Electronic Arts.

The game, no, sorry, the simulator lets you choose from a number of aircraft which you fly either from inside or externally—as with **Interceptor** and **Starglider II**. Missions take place over a landscape similar to that in **Virus**. It will be really spectacular; Argonaut is a stickler for accuracy and promises the best flight model ever.

The same claim is being made by Digital Integration, well known for PC and 8-bit simulators. **F-16 Combat Pilot** will be their first Amiga release. This can be played either as a strategic operation or a combat game. Digital Integration has good contacts with the RAF (although there are no F-16s stationed here), and have equipped their planes with the very latest technology. Dave Marshall, the owner of the company, is an ex-pilot and is rumored to have tested the accuracy of his game by trying a military simulator.

But it is not only games which tempt Amiga owners over here. HiSoft has the best selling Amiga assemblers, **Devpac** and **Devpac II**, which are much faster than things like CAPE 68K and the Metacomco packages. They have recently released a BASIC compiler which is compatible with AmigaBASIC. A new British assembler is code-named **Argasm**. It is to be produced by

Argonaut software as a fully featured, high speed assembler without an editor or any of the frills of something like Devpac. Originally developed to be an in-house tool (and as a hobby for Jez San, the company boss) it is now looking for a publisher.

An established product making a bid for the U.S. market is **Protext**. This is a character based word processor. It does not support fonts but is very fast (I'm using it to write this report). The spelling checker is also fast, faster than that used by WordPerfect, and the program does not slow when you run a second program. Protext has proved very popular with the British computer press, many of whom have used it on PCs and 8-bit machines, but it does not support intuition-style requesters and breaks one or two of the Commodore guidelines. It is a very powerful word processor. I use it all day, every day and recommend it whole-heartedly.

Commodore technical support in the UK is reasonably good but does

not rival that given by the departments at CATS and West Chester. This means that a good number of programs fail to use the Amiga fully. There are no good games which give back control to AmigaDOS the way Roger Rabbit does, and many utilities fall short of providing proper requesters. So, it is nice to find a purely British device which follows all the rules. **MicroText** is a device which extracts data from British television signals and displays it as text. The generic name for this is Teletext and the MicroText adaptor allows the Amiga to receive Teletext. It also allows the monitor to be used as a television set.

### **Video Language**

Microtext is also the name of a language used for controlling video applications. Ariadne software has a version of the language along with a package comprised of a genlock and video disk controller which runs on the Amiga. One of the products they use is the Amiox board. This adds

four serial and four parallel ports to the A2000, but is expensive at around \$1,000.

Perhaps the most important thing that has happened to the Amiga in the UK is that the people at Commodore have found their feet. In the days of the PET Commodore had total domination of the UK microcomputer market. Under first-class leadership it became the most profitable division. However, the people responsible for this success were promoted to international affairs and their successors, who faced stiff competition from MS-DOS machines, lost out.

Now Commodore has appointed a much stronger management. Under the leadership of Steve Franklin and a host of top flight aides, the company looks set to reclaim the crown. Big advertising budgets and an awareness of what the customer really wants have helped Commodore regain their image in the eyes of the British public. Of course, having the best computer in the world helps. ■

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# Kamikaze Chess

**Lose your pieces to win the game!**

PROGRAM BY JIM KENT  
ARTICLE BY HEIDI BRUMBAUGH

If you think chess is a staid old pastime, let the author of Aegis Animator and Zoetrope put some new life into the Game of Kings. Play Jim Kent's Kamikaze Chess against a friend or the computer, and see who can "win" by losing all their pieces first. This AMIGA *Plus* Disk game—programmed in Aztec C and assembly language—isn't as easy as it sounds. Fast thinking is definitely required.

Kamikaze Chess is a mirror-image chess game. It's played like standard chess, but with one important difference. The object of the game is to force your opponent to take all your pieces. If you win, you lose—and vice versa!

### Instructions

Kamikaze Chess is on this issue's AMIGA *Plus* Disk. See the overall disk instructions elsewhere in this issue. To start playing, double-click on the Kamikaze Chess icon. When the game screen appears, use the menu to select an opponent. Your four choices are: Amiga vs. human (Amiga goes first), human vs. Amiga (you go first), two humans play, or watch the Amiga play both sides. Press Q to quit the game anytime.

Move the pointer into the square of the piece you wish to move and press

the left mouse button. While still holding the mouse button down, move the pointer to the piece's new position and release the button.

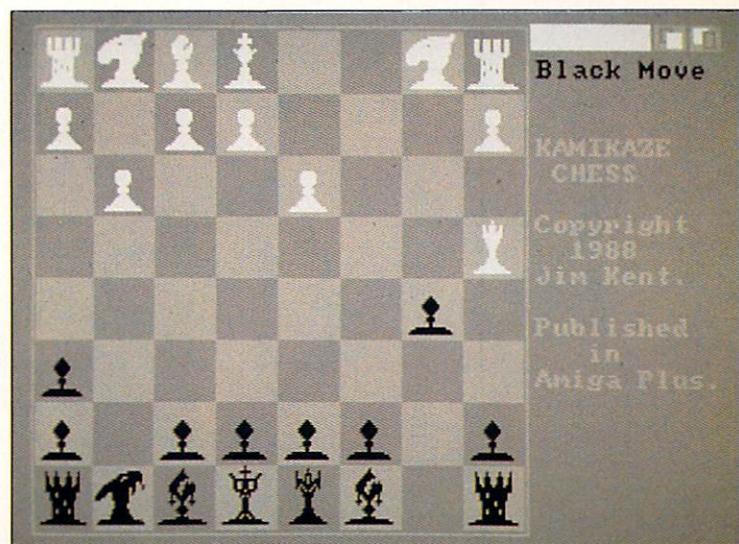
If you prefer to use the ARROW keys, press any key (except Q) to highlight the last piece you moved. Then use the ARROW keys to move the highlighted square to the piece you want to move and press RETURN. Now use the ARROWS to highlight the square to move to and press RETURN. Whichever method you use for moving the pieces, you can take back your last move by pressing the BACKSPACE key.

An experiment in artificial stupidity—the computer will try to win by losing all its pieces.

All legal chess moves are allowed in Kamikaze Chess, including castling and capturing pawns *en passant*. Castle by moving your king two spaces in the appropriate direction. If one of your pawns reaches your opponent's home row, it will automatically become a queen. If you need to brush up on legal chess moves, there are plenty of books at your local library or bookstore to get you started.

### In The Castle

Kamikaze Chess has very few special rules, the main one being that if you are in a position where you can



take one of your opponent's pieces, you *must* do so. If you are in a position to take more than one piece, you can *choose which one* to take—but you must take one! If you are in check, however, you must move out of check—and if you can do so by taking one of your opponent's pieces you must do that.

Just as in standard chess, you cannot move into check. However, this rule changes when the only piece you have left is your king. At that point your goal is to move into check and force your opponent to take your king. If this happens, you've won the game (by losing it).

The program will check for legal moves and will also alert you to forced capture positions if you try to move a piece instead of making an available capture. Also, you can't ignore a check if you have other pieces on the board. If both kings are the only two pieces on the board, make sure that you move your king into capturing range first. Then your opponent will take you—and lose.

### Strategy

In Kamikaze Chess, the pieces that would normally be the most valuable to you can hurt you the most. For example, one rook on your seventh

**Pieces that  
would normally  
be most  
valuable can  
hurt you the  
most.**

row can be forced to pick off most of the opposing pawns if they manipulate the situation properly. Similarly, a queen on the opposing home row may not last very long, but could be forced to take several major pieces before getting captured.

Pawns can't do too much damage, so if you're in a position where you can take either a pawn or another piece, your best bet is generally to

take the pawn and try to force the other piece into your home row. Toward the end of the game, pawns can be difficult to get rid of, so you will probably want to turn them into queens and make them more mobile. (HINT: you can usually get rid of a queen or a rook by putting your opponent in check twice in a row.)

### Ready To Lose?

The computer will make a formidable enemy, so you may want to play a few games against it to get the feel of how the game works and what strategies to use. Kamikaze Chess makes a challenging diversion from most computer games. It's fun to play, requires skill and fast thinking, and best of all, unlike many computerized chess games, it actually gives you a good chance of beating the computer! ■

*Jim Kent wrote the commercial graphics software Aegis Animator and Zoetrope. Heidi Brumbaugh is a Programs Editor at Antic Publishing.*

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# Fine Art of Color Cycling

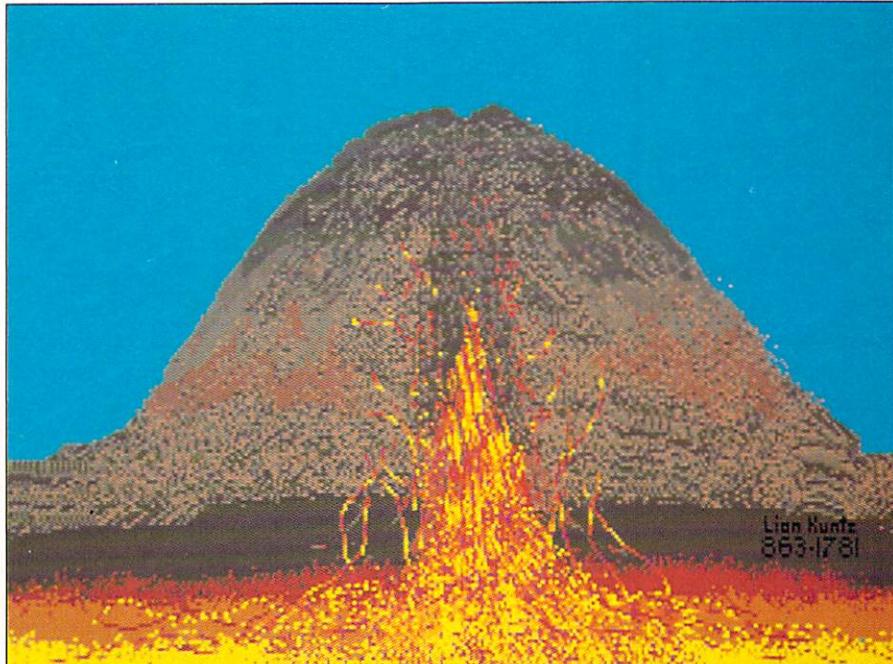
## Amiga's Easiest Animation Effects

BY LION KUNTZ

*Simple—but surprisingly effective—animation effects, demonstrated and clearly explained by a top Amiga graphic design professional.*

Color-cycling is a special effect which was part of the original charm of the Amiga. Back at SigGraph 1985, when the public was seeing the Amiga for the first time, there were pictures with flashing colors and color animations through register cycling. The first three paint programs (Images, Graphicraft, and Deluxe Paint 1.0) offered color cycling. For a while it was a very popular technique, and demo disks made the rounds featuring Christmas snow scenes with burning yule logs, or the abstract art of Escher.

That was when there were less than 100,000 Amigas worldwide. Since that time, more sophisticated software has become popular, like 3-D animation programs with HAM and Phong smooth shading. More than half a million Amiga owners have never seen much in the way of color cycling effects, and may never



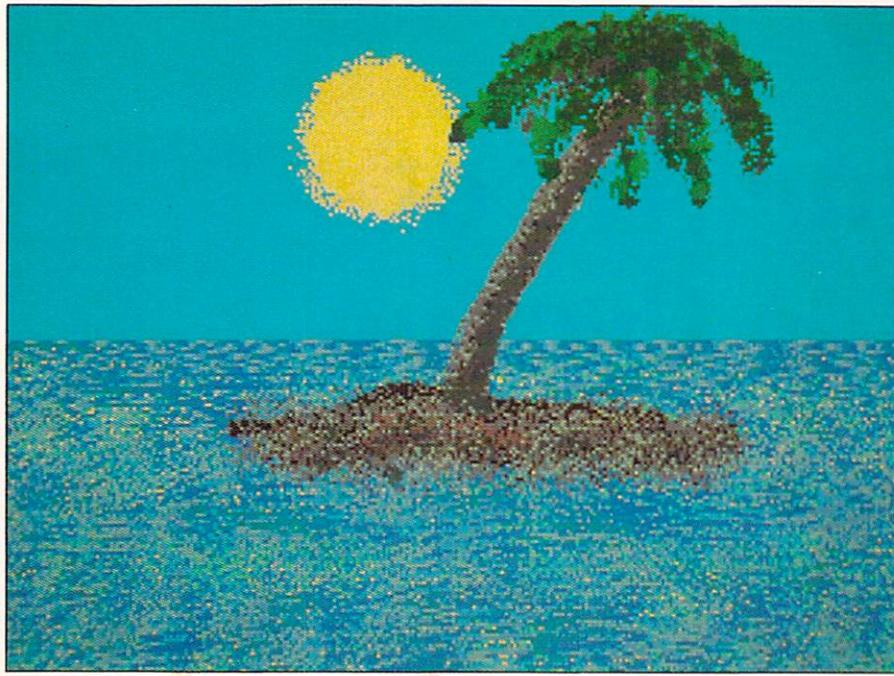
Vulcan 1

have tried their hand at it.

Included on this issue's AMIGA Plus disk are two examples of art with color cycling as the major effect. They are stored in a drawer called "Color-Cycling." Using these examples I hope to give you a good understanding of how to use many software packages to create your own fine art with animated colors.

### About The Examples

Before you read on, open the drawer with the examples and click the "play" icon to bring up the selector. Click on a file name, either Vulcan1, or O\_Ocean and then click the box marked play. After you have enjoyed one of these examples, press the Spacebar to exit to the selector. When you are finished viewing ex-



O\_Ocean

amples, click the exit box to quit the selector program.

All the images were made with Deluxe Paint 2.0, and the color cycling was designed in at that time. Then to make it easier showing these to people who may not own Deluxe Paint, they were loaded into Aegis Animator and Ani scripts were created and saved out to disk. The play program is a copyrighted, freely redistributable program designed to play Ani scripts and let you see these pictures without owning Deluxe Paint.

Since I was using a real animation program I was able to include real animation in one of the scripts along with color-cycle animation. That is the O\_Ocean example, and it gives me a chance to explain the differences between color animation and object animation.

### Color Cycling Basics

Computer beginners will need to understand some basic concepts of Amiga graphics before going on to the actual color cycling process.

A computer like the Amiga doesn't actually have any colors inside it—it

only has numbers. These numbers sent to a color monitor are translated into colors by the electronics of the monitor. Computer pictures are really "paint by number" programming. Every dot on the screen has a number, and when a picture is saved to disk it is all numbers stored in the file.

Computer electronics deals with unit numbers called "binary" and the numbers are made up of "bits." This is a very old system going back to the days of gold coins called "pieces of eight." If you bought something that was less expensive than a whole gold coin, the gold would be cut in half with a knife, the half into quarters, and the quarters into "two bits." Gold was soft enough to be tested by biting it, and if it was real it would dent, but if it was alloyed with cheap metal it would not dent or bend. A bite of gold was eight bits, and a "byte" in computers is eight bits. There's really nothing difficult about understanding binary arithmetic if unschooled buccaneers could get the hang of it.

Every dot on the screen is called a "pixel" (or PICTURE ELEMENT). In the

lowest resolution there are 320 pixels in each row across the horizontal width and 200 pixels in each column down the vertical height of the screen. Simple multiplication tells us there are 64,000 pixels in low resolution ( $320 \times 200 = 64,000$ ). In RAM memory there are bits stored which represent that picture. Besides RAM memory there are some special places on one of the custom chips in the Amiga called color "registers" and each of these registers hold 12 bits (four bits each for the Red, Green, and Blue) which tell the monitor what color to display. There are 32 color registers, which mean you can use 32 colors at one instant of time.

Binary math only uses two digits—zero and one. You start counting from zero and get up to one and that is as high as you can go before needing another digit. If you only have one bit you can only have two choices—zero or one. If you have two bits you have four choices: zero-zero, zero-one, one-zero, and one-one. If you have three bits you have eight choices; four bits give 16 choices, and 5 bits give 32 choices. Normally the programmer protects you from having to know any of this. But a little understanding is needed

**With color animation, nothing actually moves in the picture—only colors are being swapped.**

to advance on to better control over your machinery and getting more out of the software you buy.

On a 32-color picture all the color registers are being used. Each pixel is five bits and points to one of the 32 registers to tell what color it is supposed to be on the monitor.

Pixels in pictures do not have any

color in particular—they only point to one of the registers. If you change the bits in the register, every pixel in the picture which is pointing to that register will get a new color all at once. It's a lot faster for a program to change a few bits in a few registers than to change every bit of the 64,000 pixels of the picture.

### How It Works

What color register cycling does is play a game of musical chairs with the bits in the registers. Computer electronics always begin counting from the number zero, so the 32 registers are named "register 0," "register 1," et cetera, up to "register 31." Register 0 is always the background color or border color and normally you skip this one in cycling effects. Most software which allows cycling lets you pick a "range" of registers to cycle, and the speed of how often this happens per second. A range is a series of registers which are adjacent, like 1-2-3 or 15-16-17-18.

If the range is registers 1-2-3 and the speed is one second, then every second you would get the rotation 1-2-3, 2-3-1, 3-1-2 and end back where you started with 1-2-3 again. What's really happening is a copy of the twelve bits in register 1 is stored in register 2, a copy of register 2 is stored in register 3, and a copy of register 3 is stored in register 1.

Every pixel in the picture which was the color of register 1 is now the color that was the pixels of register 3, the pixels which were the color of register 2 now have the color formerly of the register 1 pixels, and register 3's pixels are colored with register 2's former color. And so on and so on.

### Volcano Flow

Now we have the basics to understand how to get our own effects, and we can use the examples on disk to explore how the theory really works in practice. The simplest example is Vulcan1, which shows a volcano erupting continuously. There is nothing "moving" in this picture, only colors are being swapped. Two

ranges are being cycled—registers 6-13 are the fire under the mountain and registers 15-23 are used to make lava flow from the peak down the mountain sides.

In the fire below the mountain you paint the picture with color cycle turned on, sweeping the drawing brush in the direction where you want the animation effect to move later when the finished picture is viewed. So under the mountain there are large brush strokes and fine line brush strokes sweeping in an centerly and upward direction.

In the mouth of the volcano begins the second set of colors. They are painted one color at a time without color cycle turned on. Cycle will be added later for the finished picture effect. Using a sequential range of colors, the mountain top and slopes are painted in a lava flow effect.

The underlying mountain shape is also painted with color cycling and then the color range is eliminated so that it won't cycle. Using an airbrush spray to spatter pixels around in all the colors of the set created the random look of natural objects.

The picture was created quickly, in less than 20 minutes from start to finish. It is not very hard, but requires thinking ahead and planning how many colors will be needed for the static parts and how many sets of colors can be available for the moving parts. Then the actual color palette needs to be created to begin the painting. Using Deluxe Paint 2.0 I know I have four color ranges I can use at once. But I also know that people who load this picture into Deluxe Paint 1.0 only have three ranges to use and range #1 will be lost to them. I decide two ranges are enough. Besides, using Aegis Animator to show the picture here on this disk allows me to have an unlimited number of ranges.

### Ocean Objects

A second example combines color cycle animation with real animation. Ocean script combines a background picture of an ocean with the waves drawn with color cycling in

mind. There are also three objects—a sun, an island with one palm tree, and a piece of the ocean exactly matching the picture behind it. The only part which actually moves is the sun. Everything else stays still, but with color cycling added to real object motion many effects will be achieved.

The sun is painted with spray brush in random tiny pixels of three

I had the color palette change even as the colors were cycling, to get a tropical sunset effect.

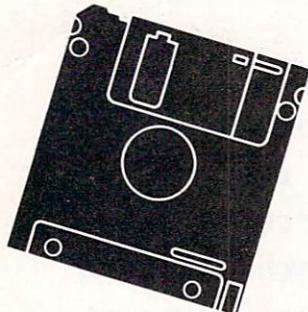
shades of yellow. The sun is color cycled to give it a shining glow effect. The island and the ocean patch are loaded after the sun. Animator assigns forward and behind priority to objects in the order they are loaded in, so the newest object loaded is always on top of every other object previously loaded. I want the sun to pass behind the palm tree and to sink into the horizon behind the patch of ocean, so I load the sun first. If I wanted the sun to pass in front of the tree, I would load it after the island brush object.

You will notice the island is spray-painted as is the palm parts, so I can accomplish color transitions to these. And spray and reflection spots on the ocean are also spray painted to add more interest to the scene.

Using a dozen tweens, I move the sun a little at each tween until it is totally hidden. The part of the ocean hiding it is just large enough to cover the sun object. By keeping my objects as small as possible I save precious RAM memory and especially valuable CHIP memory. That is the secret to making longer animations with more parts and more action.

I decided to change not only the

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colors by cycling, but also the palette to try to get a tropical sunset effect. Each tween after the sun passes the scene becomes more red, red-blue and purple until sunset is achieved. I am not only playing musical chairs with the number swapping between registers, but I am changing that number at the same time. Again, this conserves memory because just changing 32 registers of 12-bit binary numbers is less than loading entire pictures with 6,400 pixels each. Animator lets me do this with mouse clicks on the palette instead of needing to know the 12 bits involved. I just click the mouse on a color and slide the color control gadgets to get the shade I want. Animator does the math invisibly and I don't really need to understand what it is doing to make it work for me.

Everything so far was created in Deluxe Paint. One last effect inserted at the last minute actually used Animator to add an effect. As I darkened the sky I want stars to start to appear in the sky and twinkle a little. So I used Animator to add some points in the sky area in the same color as the darkened sky, but using a different color register. Then by brightening this and adjusting it slightly in the remaining tweens I could get some stars in the night sky. Finally, I faded toward black of the whole palette set.

Software able to do color cycling effects includes paint programs, animation packages, video titling and slideshow programs. Some programs can only load and display color cycling pictures which have been created with other software, and cannot themselves create color cycle images. ■

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*Lion Kuntz is the proprietor of Lion's Amiga Art Studio in San Francisco. His Amiga text fonts have been published as a four-disk set by InterActive Software, on Aegis products and as part of the WordPerfect package.*

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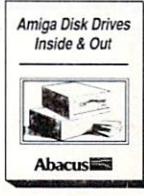
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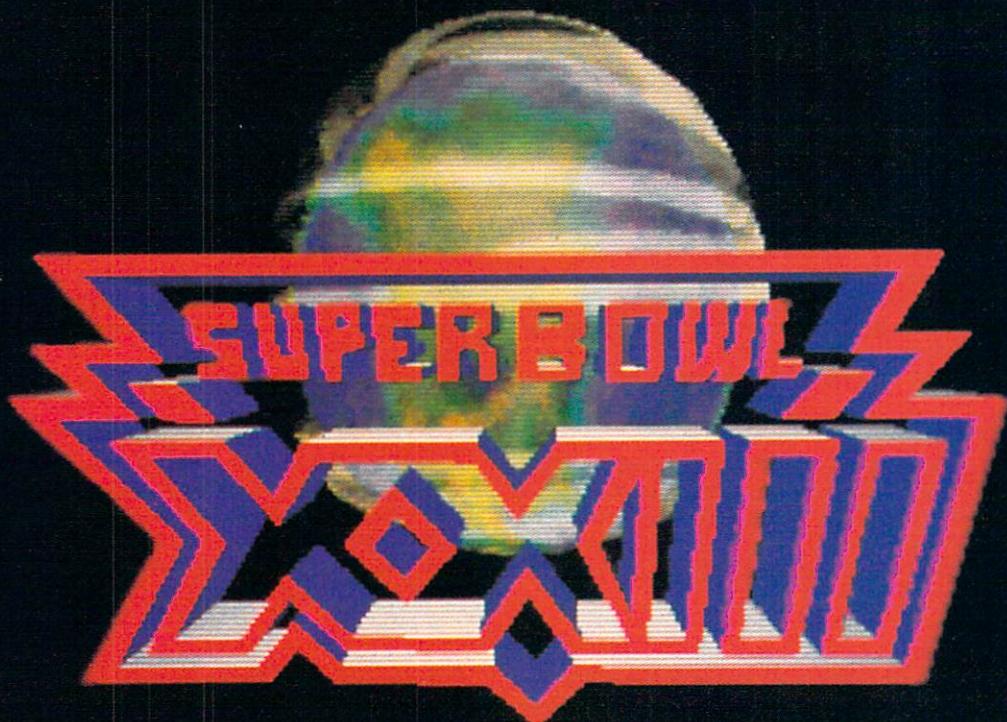
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*Three years ago,  
when I first sat down at the keyboard  
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you told me I would be displaying Amiga video graphics on  
a 40-foot RGB monitor at the 1989 Super Bowl.*

*Well, it's no dream.*

*Welcome to Super Bowl video,*

*Amiga-style.*

# SUPER BOWL AMIGA SHOW

## *Animating Miami Stadium's 40-Foot "Jumbotron"*

ARTICLE, ILLUSTRATIONS  
AND VIDEO GRAPHICS  
BY JOEL TESSLER

Two years ago, my high-spending friends snickered at my notion of putting Amiga graphics on the 40-foot Jumbotron at Joe Robbie Stadium in Miami. So I decided to do my first Dolphin video. My friends stopped laughing when they saw Amiga video at every home game.

Throughout 1988, I had been briefly discussing the upcoming Miami Super Bowl with Rhonda Lev, the stadium's scoreboard/control room video producer. Then about one month before Super Sunday, right after coming off three solid weeks of work to complete the regular season, I had a meeting with Rhonda and we decided on the necessary video graphics for the event.

There were to be three elements: First, arriving fans would be greeted by an animated logo for Joe Robbie Stadium and Super Bowl XXIII. Second, an Amiga animation called "Great Run" would be created for the Whiteway Scoreboard—Robbie Stadium's 40-foot display consisting of a 90 X 160 lightbulb matrix.

Finally, there would be several .IFF backgrounds for general use.

It would be impossible (almost) to get everything done by the time Super Sunday rolled around. I needed help.

### **SuperBowl Amiga Team**

The first thing I did was call Brett Cramer of the Computer Room in Ft. Lauderdale and get an Amiga 2000 built with full CSA hardware add-ons, including a 68020/68882 board, 8 megabytes of 32-bit RAM and a 60-megabyte hard disk. Brett asked when I needed this brute. I told him, "in five hours," and there was a bit of dead air on the phone.

I picked up my new AWAC (Amiga Workstation After CSA) later that night. When I arrived at the shop, Brett and I decided that it would be better to also build a *second* Amiga system, equipped with an A-Squared Live! 2000 board, SunRize Industries' Colorsplitter (for use with Digi-View) and a SuperGen genlock. Extra RAM and a hard disk were stuffed into what little space was left.

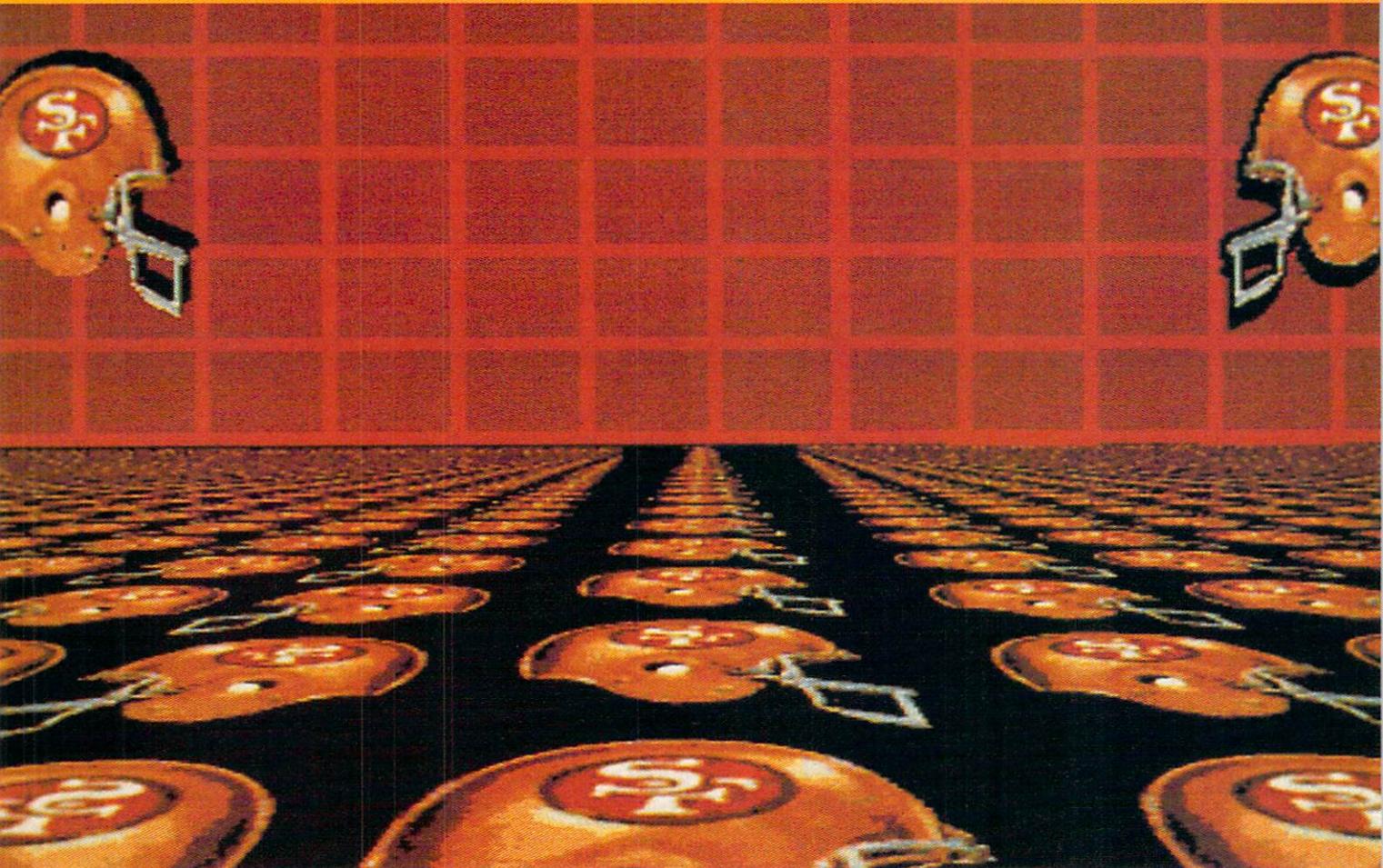
Both computer systems were loaded (ever so carefully!) into my station wagon for the trip back to Miami, and I spent the rest of the night setting up both systems to start work the next day.

The Amiga 2000 with the Live! frame-grabber was genlocked to the AWAC—so I could simultaneously generate background picture files and animation overlays. This configuration saved considerable time during rendering.

### **Great Run**

I had decided to make an animation with Invision and Zoetrope, and try to export it directly into the Whiteway lightbulb display. This presented a real challenge because the Whiteway's paint controls consist of the plus (+) key for adding a dot, the minus (-) key for erasing a dot, and the directional arrow keys. However, this system could capture line artwork with a camera or on a video directly from tape.

I took home some Robbie Stadium highlights footage and ran the tape



output through a Live! board using Invision software. Finding a tape sequence of a Miami Dolphin running down the field, I grabbed this chunk of footage into a 34-frame Invision rif. Then I pressed [F1] and watched a loop of the run. After studying the loop, I could see that this would work on the Whiteway. The Invision rif was converted into 34 separate IFF files and loaded frame-by-frame into Zoetrope. This sequence was then saved as a Zoetrope rif.

After the sequence was saved, some processing was done. I removed background grass for additional clarity. And I outlined the runner, reducing him to a wire-frame look. The animation was saved frame-by-frame to a Panasonic S-VHS AG-7400 tape deck and scanned into the Whiteway, one frame at a time. After some file operations on the Whiteway (using PDP-11/45 computers), the sequence was brought up and displayed. The animation worked well, but it still needed some

**Rendering took  
nearly four  
days – the final  
playing time of  
the animation  
was about one  
minute.**

cleaning up—easily done with Zoetrope. The finished frames were then fed back into the scoreboard and the text "Great Run" was added. Right before my eyes appeared a 40-foot Zoetrope runner with text above.

Background files were created with Deluxe Paint II, Pixmate, Photon Paint, TV Text and Diamond. These files are used during the Super Bowl to provide a backdrop for the stadium's high-resolution character generator. The files are various football scenes and objects, helmets, team names, etc.

One of the main considerations for the animation was software. I had been using Forms in Flight II during the season, with good results. However, I couldn't find any 68882 math libraries available. Wanting to finish the Super Bowl videos before the next Ice Age, my software choices were limited to products which supported both the 68020 and the 68882 chips. Sculpt-Animate 4D and Turbo Silver are the only packages I found which seem to fit the bill.

Shortly before the playoffs, I had the opportunity to fool around in Impulse's Turbo Silver with Rick Rodriguez, program manager at Dynamic Cablevision in Miami. Rick had previously purchased CSA hardware and had been pumping out some pretty exciting graphics for the past two and a half years. We previously collaborated on some of the Dolphin videos and I knew Rick's Amiga video knowledge would be of great value to the Super Bowl project. I found Turbo Silver very

straightforward and easy to get into. After playing with it, I was able to create an animated Christmas scene for the last game of the season. I managed to complete this short animation within five days after I first set my eyes on the Turbo Silver documentation.

Meantime, Brett Cramer had just received the new release of Sculpt-Animate 4D. I immediately went the Computer Room and loaded it into Brett's CSA 030 Amiga system. I was very impressed. However, Turbo Silver seemed to be much easier to use, and faster too. In addition, Impulse has a toll-free user hotline which I knew would come in handy when I needed Turbo Silver questions answered quickly.

### Space Stadium

I like space scenes, so I began to construct a storyboard where the earth would be spinning, with clouds banded around the planet. As the earth grew to  $\frac{1}{4}$  screen, the Super Bowl XXIII logo swoops in from the top and rotates behind the planet. While this is happening, the Joe Robbie Stadium logo comes in from behind.

Then, as the Robbie logo remains stationary in front of the earth, the Joe Robbie signature moves into position and then some Zoetrope football players run right through the center of a palm leaf into the full screen. The logo and earth then retreat into the vanishing point as the State of Florida zooms out into space. As the peninsula gets to full screen, it also shrinks while the stadium comes up behind it. The camera then zooms into a long view of the stadium and works its way to the end zone.

The Super Bowl XXIII logo now comes in from the top and perches above the upper deck of the stadium. The final scene, with the logo over the stadium, shows an excited crowd filling the stands and cheering wildly, captured on Live! with Invision software and then processed and animated with Zoetrope. Using Zoetrope helped get rid of that "solid only look" and put some character

animation into the scene.

The final playing time of the animation was about one minute. Rendering took nearly four days. Rick Rodriguez moved the entire 9 megabyte file into his Amiga system and started checking all our scenes. After some problems and, yes, some compromising we recorded on tape.

The Super Bowl Amiga Animations were really a team effort by some very dedicated people. I simply could not have pulled this project off without the help of: Brett Cramer of the Computer Room, who donated two loaded A2000's (plus a whole lot more); Rick (render man) Rodriguez; A-Squared (Live!); Elan Design (Invision); Antic Software (Zoetrope); Innovision (Video Effects 3D); CSA's upgrade boards; and the Turbo Silver gang at Impulse.

. . . At the moment, I'm trying to put together one more animation with Video Effects 3D, from Jim Schneider's Innovision. I want the helmets of the opposing teams to fly up over the field to the upper left and right of the screen. Then they'll collide in the middle and shatter. It was a good year out at Joe Robbie Stadium, even though the Dolphins had some problems. The fans were behind the team all the way; we had 62,000 people at the last game and the Dolphins won!

But I think the stadium's real winner this year is the Amiga—one of

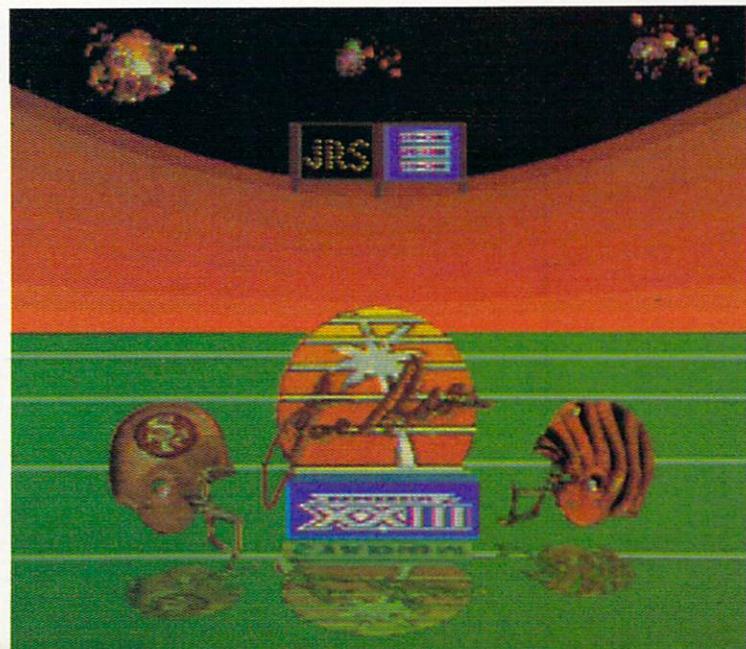
the hottest computers going. The Amiga has really come of age as a video workstation.

Well, I'm writing this at 4:35 a.m. My eyes are bloodshot, the Amiga 2000 fan motors seem to be getting louder, and I am seeing double. It's not that bad—Hey, what if . . . ■

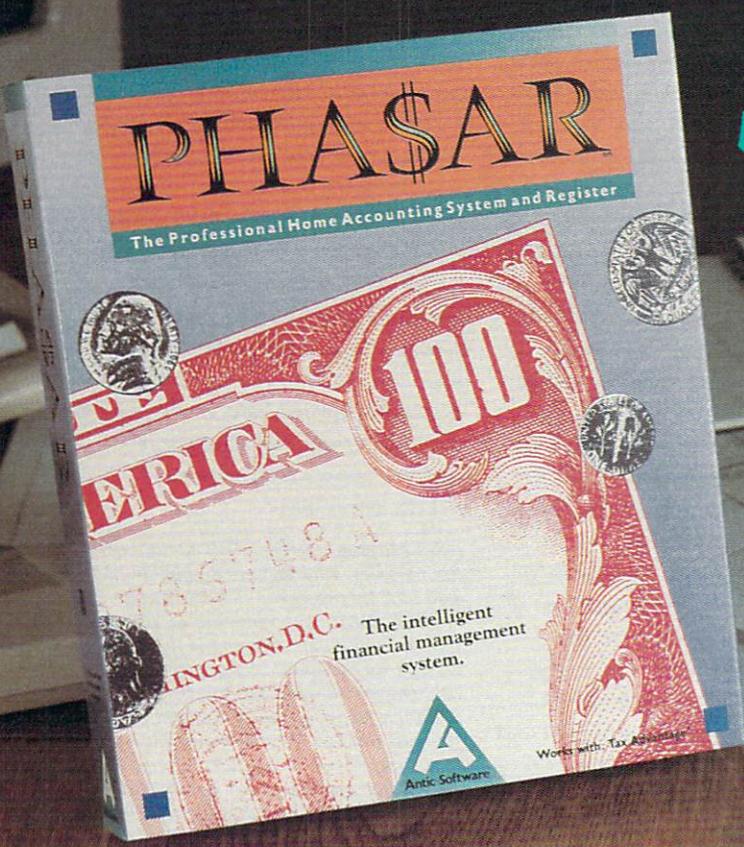
*(Right at deadline, we were able to squeeze one Super Bowl graphic onto the AMIGA Plus Disk. If you didn't glimpse much of Joel Tessler's Amiga art during the game, blame it on the NFL and the TV network—who had their own priorities. Fortunately, Joel will be able to make slight adaptations in most of the visuals described here, so they can be displayed fully during regular Dolphin games next season.)*

—THE EDITORS

*After playing synthesizers in rock bands for 13 years, Joel Tessler bought an Atari 800 and learned how to program by reading Antic Magazine (he owns every issue). He got very interested in the 800's GTIA chip designed by Jay Miner. While waiting for Miner's Amiga, he purchased a Mindset computer and an ST. Joel has worked on numerous paint system computers costing 100,000 and up. He is now a die-hard Amiga user who believes that the Amiga created a sort of technological revolution which is ending the heyday of the "high-end elite." His Amiga video credits include commercials for Ryder Truck, Cystic Fibrosis Foundation, Mini Mag-Lite and United Negro College Fund. He has exhibited at Lowe Art Museum and the National Association of Broadcasters 1988 convention. And he is on the video scoreboard staff of Miami's Joe Robbie Stadium.*



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CIRCLE 804 ON READER SERVICE CARD

# New Amiga Music Software

D R . T ' S C O P Y I S T P R O F E S S I O N A L , M I D I M A G I C

Reviewed by Rob Griffith

## **Dr. T's Copyist Professional**

I approached Dr. T's *Copyist*

**Professional** with a combination of fear and joyful anticipation. After having used Dr. T's popular KCS sequencing software (See review in next issue of *AMIGA Plus*) and several Dr. T patch editors, I was braced for a program that was *very* powerful, but difficult to learn. And I expected the manual to be a confusing mess. Happily, *Copyist Professional* is packed with powerful features. Even more happily, this time Dr. T has come up with a comprehensible manual and a logical user interface.

This software's major breakthrough is that it finally allows the Amiga user to create—and print—truly professional music scores. Scores can be entered directly on the monitor using the mouse and keyboard, or they can be transcribed from MIDI sequencers. And there's a great deal of flexibility in the way these scores can be formatted.

In the Score Editor window, a small edit cursor box is positioned on the screen. A symbol is selected for entry either by picking a menu item with the mouse, or by a set of keyboard strokes. Some of the more complex symbols can only be entered from the keyboard. There is also a Help screen accessed by press-



ing the HELP key.

After the edit cursor is positioned onscreen, a variety of symbols can be placed using the three Symbols menus. The Symbols1 menu contains many of the most common symbols—including note heads, accidental signs and dynamic markers, as well as the staff. The Symbols2 menu includes clefs, time signatures, and or-

nments. The Symbols3 menu includes rests and guitar tablature signs. Symbols that can be entered only by key commands (not the mouse) include bar lines, dots, stems and user-defined symbols.

Phrase symbols such as ties or trills that extend over several notes are entered by positioning the cursor at the starting point of the symbol and

pressing a key, then positioning the cursor at the end point and pressing a key again. Slurs require four points to be specified by cursor.

Commands used for manipulating groups of notes include—cutting, pasting, erasing, or moving. A range of notes is specified by dragging a square around it with the mouse. When the mouse button is released, a Range Edit dialog window opens for you to select the type of edit and which symbols the edit will apply to—all, text, rests, ledger lines, upper stems, lower stems, staves or bar lines. These commands can also be executed with a series of keystrokes.

Besides the standard editing mode, there are three other modes for entering data on the Copyist Professional screen. Text mode is used for entering text. Keyboard mode is used to enter note heads at specific pitches. Join mode is used to add stems and beams to sets of notes.

There is also a fairly simple Font Editor which allows the user to create as many as 10 user-defined symbols. This editor consists of three windows showing the screen, dot-matrix and laser versions of the symbol. Ten buttons at the bottom of the screen are used to pick which symbol is being edited. Symbols are edited by toggling on/off pixels with the mouse.

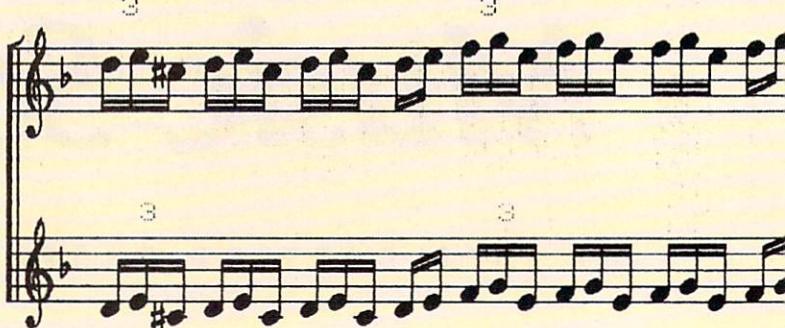
Copyist Professional lets you take long sequences of keystrokes and save them as macros. So if you need to use the same sequence of commands over and over, this vastly simplifies the process.

After a complete score is written, you can easily extract individual parts. Suppose you want to extract the part that will be played by the trumpeter. Just click on the Parts Program icon from the Workbench. This opens the Parts window, where you specify which score file you are extracting the parts from, and the name of the file you are saving to. In this window you also enter how many parts will be created, the number of staves per page, and which staff or staves from the source score go to which destination part. It is possible

**FIGURE 1.**  
Hewlett-Packard Deskjet printout of Copyist Professional score.



**FIGURE 2.**  
Seikosha SP-1000A dot-matrix printout of Copyist Professional score.



to merge several staves in the original score into one staff in the extracted part. The extracted parts can be transposed. This is useful for instruments which are not in concert pitch—such as an E-flat saxophone.

When scores and parts are completed, they can be printed as draft-quality scores for quick reference, or as manuscript-quality scores for performance or publication. Copyist Professional supports Amiga printer drivers for dot-matrix printers as well as Hewlett-Packard Deskjet or Laserjet Plus/II printers for producing really high-quality output.

Converting sequence files into scores is a relatively painless process. Copyist Professional will convert SMUS, MIDI, and KCS .ALL sequence file formats. All the sequence parts must be put into the first 24 tracks of the sequencer. Then the sequence files are converted to stream files that the Copyist can read. Using the Import menu, select the format of your sequence file. Then you must enter the name of the source file and the name of the stream file you are converting to. After this, the Conversion Options window opens. This window allows you to select the number of staves for each track (one or two), the key signature, time signature, note value per beat, bars per line, staves per page and steps per beat. Once these parameters have been set,

you begin the conversion simply by clicking on OK.

Now the stream file must be read into a score. A new score should be opened from the Project menu. Then you select READ STREAM FILE from the Import menu. After you specify the stream file, the Transcription Options window appears. This window is where you specify transcription parameters—bars per line, staves per page, any inclusion of rests, page numbers, bar numbers, stems, beams, etc. After these parameters are set, clicking OK reads the file into the score.

Drum parts can also be transcribed, but it is important to assign each drum to the proper note. This assignment information is included in a file called DRUMSCAL.ME.

Unfortunately, at this writing, Copyist Professional's Synth Program module is not working. This module is supposed to convert scores into MIDI file format or KCS .ALL files—which would allow you to play your scores using MIDI sound modules. Dr. T promises to send Copyist owners this module as well as a backup of the program as soon as some bugs are ironed out. Apparently, converting a score into a sequence is the reverse of converting a sequence into a score. First the score is converted into a stream file and then the stream file is converted into

a sequence.

Copyist Professional is not a tool for the casual hobbyist. There is always a trade-off between power and ease of use, and this is definitely a powerful program that takes some time to learn. As with all keyboard-driven programs, you must use it often enough for the keystroke commands to become second nature. Hobbyists also like to hear their musical compositions directly through the Amiga's built-in sound hardware without going through any conversion process. Yet for professional musicians as well as serious amateurs, Copyist Professional fills a vital need among the growing number of music programs for the Amiga.

#### DR. T'S COPYIST PROFESSIONAL \$275

Dr. T's Music Software, 220 Boylston Street, #206, Chestnut Hill, MA 02167. (617) 244-6957.

Requires Workbench 1.3, 1Mb memory recommended. Copy protected. ■

CIRCLE 213 ON READER SERVICE CARD

#### MIDI Magic

If you are familiar with standard Amiga gadgets, windows and pull-down menus, **MIDI Magic** is a high-powered music sequencing program that makes it easy to record, edit and play professional-quality music with a \$200-up MIDI keyboard. (The other hardware you'll need is a MIDI interface that plugs into the Amiga serial port of the Amiga—around \$60—and at least one MIDI cable for \$5 or so.)

The basic screen features a Tape Transport window that controls MIDI Magic much like a tape recorder—with Forward, Fast Forward, Stop and Rewind buttons. The Track Display shows information on each musical track in the current sequence. On the right, a meter shows how much RAM is in use and the Play Through gadgets give you control of the MIDI input and output channels. A Panic button can instantly stop all sequencer activity.

Recording single or multiple tracks is very easy. Tap the Record Enable gadget for each track you select in

the Track Display. Tap the Master Record Enable/Disable gadget in the Tape Transport Display, then hit the Forward/Pause gadget. Now MIDI Magic will record whatever you play on your MIDI keyboard—similar to a tape recorder, except that your Amiga is recording digital MIDI information instead of actual sound vibrations. To replay your recording, first hit the Stop gadget in the Tape Transport Window, then select the Rewind gadget and finally the Forward/Pause gadget.

It's also easy to transpose (raise or lower a song's pitch), speed or slow the tempo, and reverse or delete sequences. One nice feature is a column in the Song Editor window which tells how long it takes in hours, minutes and seconds to play all the steps of your song chain including repeats.

#### 16-Track Digital Recorder

But don't let all this apparent simplicity trick you into thinking that MIDI Magic doesn't have many useful options and powerful features. A sequence of as many as 16 tracks can be recorded at one time, and multiple tracks can easily be merged into one. As many as 26 sequences can be chained together to form a song, with a few clicks of the mouse. The clock is accurate to 480 pulses per quarter note.

A Global Delete window allows

MIDI Magic  
Screen



you to filter out certain types of track events. For example, all the pitch bend messages could be filtered out of a track. There is also a track event editor which allows you to add, change or delete various types of MIDI events.

It's easy to set points for punching in or out when recording. Any time signature can be set for up to 99/99. A bright visual metronome will come in handy for those times onstage when you can't hear the audio metronome. Sequences or songs can be set to auto-loop. After a sequence is recorded, you can quantize any of it (smooth out the playing) to as great an accuracy as 32nd-note triplets. There are four types of quantization available—note coherent (shifting note on, but leaving duration the same); note duration (shifting note on and note off); note on only (shifting note on, but leaving note off the same); or note on and off (shifting note on and off to the nearest quantize point).

MIDI Magic thoughtfully provides you with four different ways begin recording a sequence. Count Down gives you one measure of beats before recording starts (4, 3, 2, 1, start . . . ) Repeat will count down over and over again until you start playing. Note Cue starts the clock when you begin playing. With Immediate, recording and clock movement start as soon as you tap the Play button.

You can customize MIDI Magic by changing the colors, metronome loudness, window locations and much more. There are numerous Help windows including a Subject Index, so it's easy to get your questions answered without referring to the manual.

### Timer Precision

One of the special features of MIDI Magic is that the timing tasks run at a very high priority—allowing the user to multi-task without the annoying timing glitches that were a problem in some earlier sequencers. To test this, I tried running Deluxe Paint while playing a MIDI Magic sequence. The timing of the sequence was dead accurate, but Deluxe Paint was a little sluggish. According to the MIDI Magic manual, the Amiga graphics engine begins to steal cycles from the CPU when using medium-resolution screens with four or more bitplanes (16 colors), or high-resolution screens with three or more bitplanes (eight colors).

For all its strengths, MIDI Magic

has some weaknesses and bugs. With certain synths (like my old Yamaha DX7) the first version tended to leave notes stuck on. As of this writing, an upgraded version without this bug is underway. Entering data in step time is unnecessarily complicated, requiring you to use both the external MIDI synth to enter a note, and then the MIDI Magic interface to advance the time clock. A sequence can't be entered without the use of an external MIDI keyboard.

The track event editor is limiting in certain ways. For one thing, the time value of an event can't be changed. Also, in order to change the value of an event, you must place the cursor over the value, press down the left mouse button and drag the mouse back and forth until you get the appropriate value. I find it easier just to type values in from the keyboard. In general, it would be nice if more of the functions could be performed from the keyboard as well as the mouse. Once you become accustomed to a sequence of keystrokes, using the keyboard is often

quicker and easier than the mouse.

Also, the current version of MIDI Magic has no facility for playing internal IFF sounds on the Amiga. It won't save files in the SMUS format, nor will it save files in the new MIDI format which allows transfer of sequences between sequencing programs and different types of computers. But the developer promises that future updates will support these formats.

Despite these shortcomings, MIDI Magic is one of the easiest sequencing programs to use and it takes full advantage of the Amiga's multitasking capabilities. Whether you're a MIDI pro or a novice, be sure to check out this software before you buy any other sequencing program.

### MIDI MAGIC

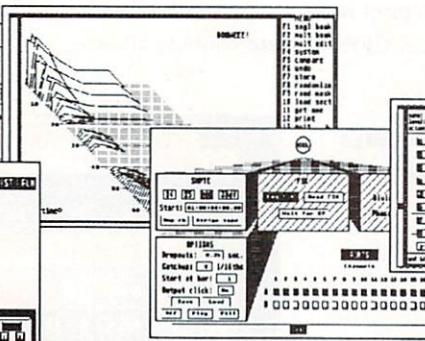
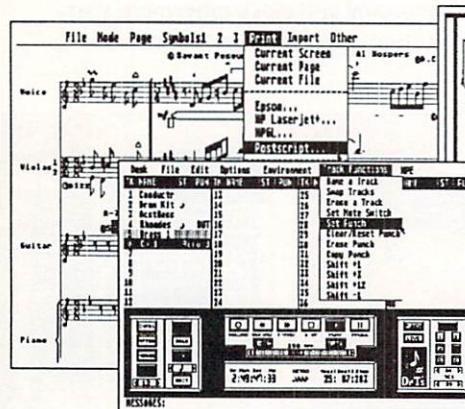
\$149.95

Circum Design. Distributed by Brown-Wagh, 16795 Lark Avenue, Suite 210, Los Gatos, CA 95030. (408) 395-3838.

Requirements: MIDI synthesizer/keyboard, MIDI interface and cables, 512K memory (1Mb recommended). Not copy protected. ■

CIRCLE 223 ON READER SERVICE CARD

# Tools of the Trade



# Tetris

GLASNOST IN A COMPUTER GAME—  
OR DIABOLICAL COMMIE PLOT?

Reviewed by Carolyn Cushman, AMIGA Plus Assistant Editor

**Hello, my name is Carolyn and I'm a Tetris addict. Before I joined Tetris Anonymous I used to play for nine hours straight, without getting out of the chair. Even when I wasn't playing Tetris, I would see little colored squares floating down all around me, and find myself humming Russian folk tunes . . .**



Loading screen, featuring St. Basil's Cathedral, Red Square.

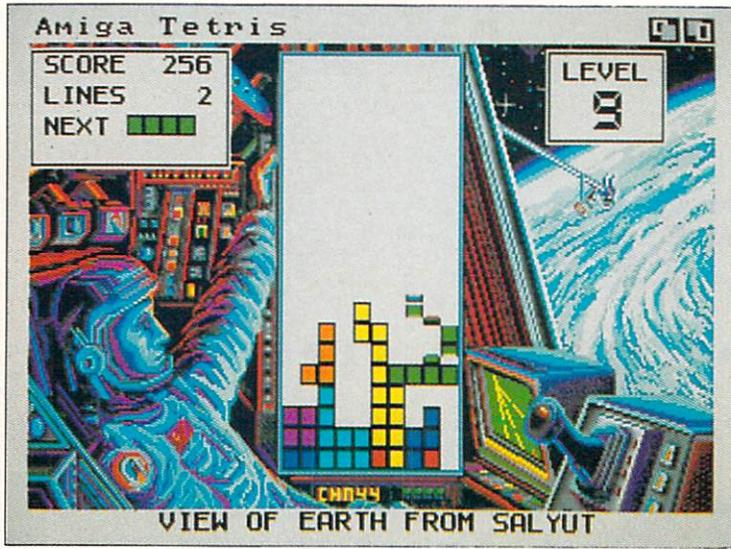
Originating in the Soviet Union, Spectrum Holobyte's **Tetris** is a powerful new addiction for intelligent gamers. The rules are extremely simple. Various shapes made up of four squares fall randomly from the top of a large rectangular box called the pit. Using the ARROW keys, you control these colored pieces as they fall, moving the shapes right or left, or flipping them into different positions. Your goal is to pack as many pieces as possible into the box.

You get points for every piece you manage to pack in. Whenever the shapes fill a complete row across the box, that line disintegrates. All the squares above move down one row. The more lines you make, the more room you have for additional pieces and the more space you have for maneuvering. For every ten lines you complete you move up one level—and the shapes start falling faster.

Points are given for the total number of pieces you manage to cram

into the box before the pile reaches the top. Also, time counts. The faster the fall, the higher the score. As soon as a piece is properly lined up, pressing the SPACEBAR drops it quickly into place, for bonus points.

Tetris is a fine example of the type of game that "takes a few minutes to learn, but a lifetime to master." You want to keep the level of squares in the pit as low as possible—but avoid stacking the pieces so you'll require one specific piece to complete the



line. That shape you *must* have never shows up when you need it, or at least so it seems.

### Level One

At the lowest levels, the pieces float slowly down to the bottom. At the highest levels, they drop at a speed that demands good reflexes and almost instinctive moves. (In double-speed Advanced Mode the pieces tumble into the pit so fast that it's almost impossible to control them, much less plan ahead.)

The Amiga version is brand-new, but Tetris has been around for about a year on the IBM and Mac. The original Soviet game has been "glamorized" for import to the decadent

capitalistic West. The backgrounds around the playing area contain vivid graphics of Russian life and scenery. An option lets you display a short text description of each scene at the bottom of your screen. With each higher level, a new scene is displayed and a new tune plays.

The background views range from the pastoral "Morning Ride Near Yakutsk" to the high-tech "Soyuz Liftoff." The familiar Russian melodies range from plaintive folk tunes to upbeat Tchaikovsky (for the subway scene). Even though repeated hearings of the music can sometimes get a little hokey, at other times the melodies help add just the right foreign atmosphere to the game. You

### Level Nine: View of Earth from Salyut

can pick out the violins and balalaikas. And for those who find the music distracting, the game does include an option to turn off the sound completely.

Unlike the graphics, the tunes are not identified. This is unfortunate, because in many other ways Tetris is an extremely educational game. Playing Tetris should help young players develop their spatial recognition skills and problem solving abilities, not to mention eye-hand coordination.

Kids might not be initially attracted to Tetris—after all, there's no violent shoot-ups to catch their bloodthirsty little eyes. But once exposed to the challenge of Tetris, even the best arcade jock should find Tetris a compelling experience.

Yes, I found myself practically hypnotized by Tetris, spending so much time trying to raise my score that I

**That shape you  
must have  
never shows up  
when you need  
it, or so it  
seems.**



### Level Five: Ural Mountains

had to write this review to justify it all. Seriously, though, I have heard about enough scattered outposts of Tetris junkies to believe that this game is destined to become a classic.

Requiring intense concentration as you struggle to place each randomly falling piece *just so*—Tetris is a great way to forget the day's hassles. If you enjoy puzzle solving and strategy games, Tetris offers you heights of satisfaction rarely found in computer games.

---

**TETRIS** \$34.95  
Spectrum Holobyte  
2061 Challenger Drive, Alameda, CA 94501.  
(415) 522-3584. ■

CIRCLE 216 ON READER SERVICE CARD

# AMIGA WORD PROCESSORS

## Which software will work best for you?

According to many surveys, word processing is the most used personal computer application. Those same surveys show that many people first purchased a computer in order to use that one application.

Word processors are also the most personal of computer applications. The way we write, whether it be a business letter or a novel, seems to be much more individualistic than how we crunch numbers in a spreadsheet or juggle files in a database.

This means there is no perfect word processor. There can never be a word processor that does everything and is right for everybody. Maybe you don't need a thesaurus, but Joe might want that feature as well as a grammar checker. Susan would give up the grammar checker in favor of having mail-merge. And so it goes, each potential user needing more or less than somebody else.

One obvious solution is to obtain a word processor with every possible feature and use only those you need. The drawback is that you'll have to pay for the total program, no matter

how little of it you may use. Another solution more recently being explored is to offer a modular word processor which can add features as you need them. But so far, programs of this kind have reached the Amiga only in a limited way.

Because every Amiga word processor shares certain basic features, I won't belabor you with repetitive descriptions about how each program handles operations such as standard fonts (bold, underline, italic, combination) or block moves (cut, copy, paste, move, search and replace). Instead, I'll try to concentrate on what makes each word processor different from the others and offer my observations on how easy each is to master.

Eight word processors are compared in this article. There are additional word processing products on the market, but I believe that the ones covered here are those best known and most widely available.

In order to put some reasonable boundaries around a big topic, this article defines word processors as excluding programs which are primarily for desktop publishing, such as Professional Page, PageSetter, or PageStream. But as you read my individual reviews below, you'll soon see that the distinction between word processors and desktop publishing software for the Amiga is becoming quite blurred.

(*A coming issue of AMIGA PLUS will compare all Amiga desktop publishing software.—THE EDITORS*)

By Ervin Bobo

### TEXTCRAFT PLUS

Textcraft was the first word processor for the Amiga and was one of the very few programs to be marketed by Commodore. Somewhat lame by today's standards, those of us who used it loved it—perhaps because it was the only productivity program available during the first months of the Amiga.

More than a year passed before **Textcraft Plus** appeared. It added multi-tasking, with the ability to work on multiple documents, thus correcting one major shortcoming of the earlier program. It also added mail-merge. Both versions of Textcraft have a copy-true display, meaning that your hard copy will be true to your monitor display—a much handier term than WYSIWYG (what-you-see-is-what-you-get). A ruler above your writing area aids in setting tabs and margins, while above that are icons representing various line spacings and text justifications. Pull-down menus are used for everything else, though in some cases the menus can be shortcut with keyboard commands.

One unique feature is the inclusion of ready-made templates for different documents. There are templates for resumes, business letters, term papers and more. You type the information into an onscreen form and it is automatically displayed with the correct formatting.

Another unique Textcraft feature is

## The Amiga Plus In-Depth Survey

animated onscreen tutorial displays that teach novices the various features of the program.

In allowing multiple documents—dependent upon the length of the documents and the amount of RAM memory available—Textcraft Plus also allows for cutting and pasting between documents.

**CONCLUSION:** Textcraft Plus will be easy to use. While it is an entry-level word processor, it will not soon be outgrown. Though it has no spelling checker or thesaurus, there are stand-alone spelling checkers available that will read Textcraft files.

### SCRIBBLE! 2.0

**Scribble!** followed Textcraft, but is a more primitive program to use—with embedded dot commands for formatting, a display that is not copy-true, and key commands modeled after WordStar. But it is still a more powerful program than Textcraft. Although I consider embedded and dot commands obsolete I do admit that, once memorized, they can be used faster than a mouse.

The real strengths of Scribble! are in its archive system, allowing the saving not only of manuscripts but of templates. If you have several writing formats, it is possible to store each of these formats in its own archive and call it up as necessary. Where Textcraft had pre-defined templates, Scribble! asks you to create your own, and for many users this freedom of formatting may be preferable to the rigidity of the Commodore offering.

Compared to Textcraft Plus, Scribble! is primitive in display. There are no rulers for setting margins, end-of-paragraph markers appear with each carriage return, there are no icons and the display uses only the four Workbench colors. However, there are pull-down menus and there is a scrolling preview mode allowing you to see end-of-page, line spacing, centering and justification.

Balancing out the display shortcomings is Scribble!'s ability to inte-

grate with the Analyze! spreadsheet and Organize! database (sold by the manufacturer as an integrated package called The Works). Because multi-tasking is supported, all three programs can be onscreen at the same time (if your Amiga has enough memory).

Scribble! 2.0 is an updated version of the original program, the chief difference being the addition of a spelling checker. It was much slower than anything I'd seen until the appearance of WordPerfect, seeming to access the disk for every word. A fix for this is to assign the dictionary to a RAMdisk, after which it becomes a very workable system. In addition to integrating with the Organize! database, Scribble! 2.0 will create and execute mail-merge lists within itself.

**CONCLUSION:** More powerful than Textcraft Plus, with every command capable of being invoked from the keyboard and most with the mouse and pull-down menus. The lack of a copy-true display is a minus—while writing, you do not see formatting, line spacing or end-of-page markers. Exiting the writing mode to invoke the Preview is a partial fix but less than handy. Still, many users swear by this one and I'll admit I'm one of them. Though it is not my word processor of choice, I do have great respect for what it is and what it does.

### PROWRITE 2.0

When I saw the first version of **ProWrite** I loved it, but for reasons that had nothing to do with word processing. I admired the use of Notepad fonts in a variety of sizes, the fact that they could be presented and printed in color. And I loved the option of incorporating colored pictures with text—even though I've yet to find a personal use for that last. Soon after it was introduced, ProWrite went through a major change. Now it offered both interlaced and medium-resolution modes, so that those who did not want screen flicker or compressed images didn't need to have them.

By now, ProWrite has evolved to version 2.0 and this one adds mail-merge and a 95,000 word spell-

checker. The copy-true display will accept HAM pictures (though they look good only in the interlaced mode), and NLQ printing is supported. Both normal and sideways printing are possible and graphics printing speed has been enhanced by the inclusion of printer drivers from Preferences 1.3.

For those writers who take several approaches to a subject, or who delight in making multiple drafts and then picking the best ideas or phrases from among them, ProWrite allows you to have as many as eight documents open at one time in separate windows.

Two related programs from ProWrite's manufacturer add even more power. **Flow** is an idea-processor (an outliner that can "collapse" or display heading categories) that is command-compatible with ProWrite. **ProScript** enables ProWrite to use the vast selection of Postscript typefaces, and also includes a useful converter for Scribble! and Textcraft files.

**CONCLUSION:** Although some of the improvements in ProWrite apply only to graphics handling, equally important features have now been added to the word processing side. Ignore the graphics and you're still left with a pretty good word processor that is easy to learn and use. It is also worth noting that ProWrite started the trend toward inclusion of graphics in Amiga programs not specifically designed as desktop publishers. That feature has now been so imitated that I have no doubt many people will choose their word processor based at least in part on its ability to combine graphics and text.

(THE EDITORS Note: ProWrite is the word processor we used for this premiere issue of AMIGA Plus and essentially we have been quite pleased with its smooth power and easy handling. One wish-list feature would be a toggle between capitals and lowercase. And we did encounter carriage returns after each line when reading ASCII and WordPerfect files. Also an overall keyboard/mouse command summary would be a helpful addition to the

	TEXTCRAFT+	SCRIBBLE 2.0	PROWRITE	WORDPERFECT	KINDWORDS	TEXTPRO	BECKERTEXT	WRITE & FILE	EXCELLENCE!
Copy-True	+		+		+	+	+	+	+
Ruler Margins	+		+		+	+	+	+	+
Multiple Docs	+	+	+	+	+		+	+	+
Spell Check		+	+	+	+		+	+	+
Thesaurus				+	+			+	+
Auto Save				+	+			+	
Mail-Merge	+	+	+	+	+		+	+	+
Column Math				+			+	+	
Grammar Check									+
Style Check								+	+
Graphics			+		+	+	+		+
Custom Fonts					TWO				+
Custom Print				+	SUPERFONTS	+	+		POSTSCRIPT
Auto Dating				+				+	
Memory Required	256K	256K	512K	512K	512K	256K	512K	1MEG	1MEG

generally well-done manual.)

## WORDPERFECT

**WordPerfect** is absolutely the most powerful word processor for the Amiga. It carries a suggested list price of \$395, but is widely available for much less. And to its credit, the program really does just about everything. Text can be formatted in columns, new fonts can be imported, there is both a spell-checker and a thesaurus (slower even than that of Scribble!, but with the same RAMdisk fix applying). And there were more printer drivers than you could ever believe—about 250 in all—so many that the drivers of Workbench were completely ignored.

On a separate disk (counting the tutorial there are four disks to WordPerfect) you set up your printer drivers as well as alternates in case you decide to use a different printer. Wordperfect probably covers everything up to the moment of its release—including drivers for laser printers.

There is also a manual that weighs about five pounds and while reading it I noticed a strange thing: It is the same manual supplied with the PC version of Wordperfect—but in the

wide margins the equivalent mouse/pull-down menu moves are listed opposite the keyboard commands. Without being a simple port, the program is probably the most perfect copy you've ever seen and for very good reason. Those who use WordPerfect on PCs should have no trouble making the transition to the Amiga version. As Scribble! bridged to the Amiga by incorporating key commands modeled after the earlier WordStar software, so WordPerfect eases the transition to a non-PC version.

Two disk drives are required—DF0: for the WordPerfect program disk and DF1: for the Speller/Thesaurus disk. This is another good argument for putting the speller and thesaurus in RAMdisk—assuming you have at least 1.5 megabytes. With a data disk in DF1: you can safely take advantage of the “timed-save” feature, where your manuscript is automatically saved at preset intervals.

WordPerfect also offers automatic outlining with varying levels of indentation and can generate both indexes and tables of contents. Columns can be set up for math with the standard four math operators working. You can work on multiple

documents (with sufficient RAM) and you can create and use mail-merge lists.

Sadly, WordPerfect is not copy-true. Embedded commands are used, much as those in Scribble! These commands are invisible and can only be seen and edited by invoking the “reveal codes” option. Sorry, but I've been spoiled by progress. I want to know how a manuscript looks before I print it.

**CONCLUSION:** WordPerfect is the most powerful of Amiga word processors—and it is the software on which I turned in this entire review to AMIGA Plus. But it is not for everybody. Unless you're doing desktop publishing—which this program is not truly capable of—do you really need to format text into columns? Unless you're in a multiple-printer environment, do you really need the complication of primary and secondary printing routines? While WordPerfect can be operated from the keyboard or with the mouse and pull-down menus (among the few concessions to the Amiga environment), we feel the lack of a copy-true display is a distinct disadvantage. When you have all this power, it would be nice to be able to see how it is being employed.

ON  
DISK

# AMIGA Plus

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#### **Directories**

The Art directory contains two formats of animations and two utilities to display them. Steve Segal's "Happy Guy" animation uses NewMovie, Lion Kuntz' Color Cycling demos use

the Aegis Animator player called Play. All these animations can be shown in part or in full by SuperView. A script file and icon called "ShowAll" will do just this.

The Programming directory contains C source code files for the Intuition Plus article, aids to compilation, and the executable file. Also included are the assembler file ExecPRT.asm, and an AmigaBASIC game, MasterMind. In order to run MasterMind, it must be copied to a disk containing the AmigaBASIC interpreter (like the Extras disk).

The S directory contains the script files MSDos and AmigaPLUS.alias which contain aliases for use with the shell. This is described in the Amiga shell article by Arnie Cachelin.

#### **Main Window**

In the main disk window, you will also see the icons for MaxiTAX, the MaxiPlan spreadsheet template for

your U.S. tax return, and KamikazeChess, Jim Kent's unique chess game. The instructions icon will display more information and help on the disk contents.

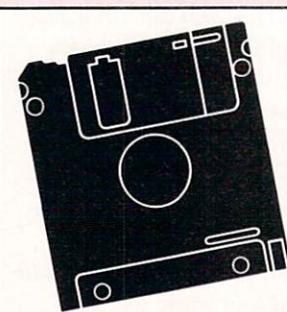
---

*In addition, this month's AMIGA Plus Disk features the following non-exclusive utilities:*

---

VirusX—Version 3.1 of Steve Tibbett's Public Domain virus fighting utility. Documentation is found in the file VirusX.doc. We have included this utility because we feel that every Amiga user should be protected from contracting and spreading computer viruses.

SuperView—Version 2.1 of David Grothe's outstanding IFF picture display program. Instructions are in SuperView.doc. This is the most powerful "show" utility we have seen, it is used to display many pictures on this disk. ■



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## KINDWORDS

Continuing the trend started by ProWrite, **Kindwords** allows the incorporation of graphics into your manuscript while still offering at its heart a good word processor.

With full mouse control and a full battery of pull-down menus, with multi-tasking capability and a copy-true display, with a fast spelling checker and the ubiquitous mail-merge, Kindwords moves us a few steps closer to what Amiga word processing should have been from the start.

In addition, Kindwords offers "superdrivers." Like WordPerfect, it has its own set of printer drivers and these are especially tuned to provide a smoother graphics printout (minimizing jaggies) than the standard Workbench printer drivers.

Version 2.0 fixes several drawbacks from the earliest version, including an occasionally scrambled scroll display. But I have still not learned a good way to delete a file except by exiting to Workbench and discarding the icon. Aside from these quibbles, Version 2.0 offers two custom fonts, has added automatic hyphenation and incorporated a 47,000 word thesaurus. Because a main emphasis of KindWords is on graphic printing, version 2.0 has been installed on a disk containing the improved printer drivers of Preferences 1.3. This adds to the size of the program, currently delivered on three disks—the program disk, another for SuperFonts and a third for printer drivers.

**CONCLUSION:** When I first saw it, I called Kindwords a nearly perfect word processor. It became somewhat less so due to the appearance of other programs that come closer to my idea of perfection. But now, with the release of 2.0, it is bounding back. It is as easy to use as Textcraft Plus and it does allow the incorporation of graphics in color or black and white. Graphics may be displayed in four, eight or sixteen colors—the more colors, the slower the screen updates.

## TEXTPRO

Imported from Germany, **TextPro** has several basic errors in construction. On booting the disk, you are

taken directly to the program where you are compelled to specify your printer driver and the probable length of your manuscript. If graphics inclusion was not the main reason for the existence of Textpro (without which it is a stripped version of the original Textcraft) that wouldn't matter. But it does matter. Here's why:

Another important TextPro feature is BTSnap. This allows you to call up any computer graphic, cut and crop a portion of it and store it in RAM for later inclusion in your document. It is a good feature and works well, but it can only be accessed from Workbench—which means you must boot the program, go through the setup, exit the program, use Snapshot, re-enter the program, go through the setup . . .

Besides, if you used a particular font—even letter quality—the program would print that font only until it reached the graphic. Then it would print the graphic and revert to standard (draft) printing. The only way to make a presentable manuscript would be to include all graphics at the end of your document. For that matter, only graphics of very high contrast, line drawings, will make a suitable printout. Most of those from your paint program library will be unsuitable and you can write off HAM files completely.

**CONCLUSION:** Though it has a copy-true display, extra printer drivers and a ruler display, Textpro is a lesser program than the original Textcraft. By today's standards, that is primitive. Getting into the program is squirrely; and for what little it can do with graphics, it would have been better not to have tried incorporating the feature.

## BECKERTEXT

**BeckerText** is a more expensive incarnation of TextPro and, to its credit, adds several features lacking in the earlier program. There is a spell-checker, two sizes of type, a good routine for defining function keys, a means of customizing printers and of course mail-merge.

The spelling dictionary does not load automatically as in most other

word processors, but must be a selection from the pull-down menu. Once in memory, however, it is very fast. Having two sizes of type is rather deceptive. The small size is an 8 X 8 matrix and the large is a 12 X 12 matrix. Change from one to another is global, meaning you cannot mix sizes within a manuscript. Perhaps the large size was meant for those with poor eyesight, in which case it could be a very handy feature.

Function keys can be defined to hold as many as 30 special phrases and this is easily done in a requester window. Select a key from the template, specify whether it is to be used in Normal, Shifted or Alt mode and then type in your string. Unfortunately, strings do not seem to be saved, meaning you must create them anew whenever you boot up the program.

**CONCLUSION:** The faults of BeckerText are the faults of Textpro: entry into the program has not been improved; graphics handling has not been improved; printing mixtures of text and graphics has not been improved. Taken only as a word processor, however, BeckerText does show improvements in the inclusion of a spell-check and in the two sizes of fonts.

## EXCELLENCE!

Perfection has not yet reached the Amiga word processor, but while waiting for it to make an entrance we can examine its understudy. From the same people who brought you Scribble!, **Excellence!** today stands at the pinnacle of Amiga word processors. In spite of its faults, such as a few bugs in the earliest release version, it is so far the highest expression of Amiga capabilities in a program designed for wordsmiths.

Faults? If it is the best, how can it have faults? Okay, for "faults" read "identity crisis." With all the features we'd expect of a top-flight word processor, Excellence adds some new tools. There is a spell-check routine that is much better and faster than what we saw in Scribble! 2.0, there is a thesaurus, there is a grammar checker and there is even an evaluation of your writing style. In the lat-

ter, your document is scanned and is assigned a readability index that is expressed in education levels. At the same time, your style is compared to three works assumed to be archetypal—Lincoln's Gettysburg Address, an Ernest Hemingway short story, and an insurance policy. Heaven help you if your ambition is to write best-sellers and your writing style equates with an insurance policy. The grammar checker looks for such things as words that should be capitalized, misuse of punctuation marks and so on. The spell-checker and thesaurus, when invoked, open windows on your work and give you a menu of choices.

There is a page preview mode unlike anything I've seen. Any two consecutive pages of your text can be displayed side by side, allowing a good look at how you've formatted the text. An example of the value of this feature is in being able to see, on one screen, both the title page and the first page of a report or manuscript. Though words typed in a standard size font will be unreadable, you'll be able to see margin proportions, justification, centering, color and every other important factor.

Excellence! is one of the Amiga word processors that allows you to incorporate graphics into your text. The graphics may be colored and they arrive bearing their own palette. Further, a graphic of any size is treated as a single alpha character. You can backspace it, delete it, justify it, cut it, paste it—do anything to it that you can do with a word or a single character.

Unlike desktop publishing programs, Excellence! does not require the use of boxes for text and graphics. This makes it easy to mix fonts within a page or even within a word. About a dozen fonts are included, some of them Postscript fonts for use with laser printers, and fonts can be drawn from other sources such as Zuma Fonts and Calligrapher.

It is here that the system breaks down. While fonts and graphics are necessary to desktop publishers, they are not necessary to word processors. In adding these features, Excel-

lence begins to tread a fine line and finally falls when it is time to print the document. There are only two modes of printing. One is a graphics mode that will take forever. The other is a draft mode that looks like—well, like a draft mode. By choosing Topaz 8 as your font and printing in the graphics mode, you can approximate something like an NLQ printout, but you'll have to decide whether the wait is worth it. On the other hand, those with access to laser printers will appreciate the inclusion of some Postscript fonts and the ability to produce dynamite printouts.

**CONCLUSION:** For my part, I'd like to see a subset of Excellence! marketed as a word processor only. Forget the graphics and the fonts, leaving only enough graphic display ability to generate the page preview and to show which words are bold, underlined, etc. Add an outliner and a notetaker, the contents of which can later be incorporated into your working document. Then give us a real printing routine. With such changes, Excellence! could become perfection.

### **State Of The Art**

As I said at the beginning, the perfect word processor does not exist for the Amiga or any other computer, because users have such drastically differing preferences. To find the software that best suits your style, the best things you can do include reading articles such as this in magazines like this, checking the feature comparison chart and, if possible, asking your software dealer to let you play a bit with the program before you buy it.

Two forthcoming products should be well worth keeping an eye out for. **Write & File**, one of the best current word processors, has just been taken off the market by Brown-Wagh to be replaced by a new and dramatically enhanced product called **Pen Pal**. And from Gold Disk, makers of the top-ranked Professional Page desktop publishing software, is coming a fast, high-powered word processor intended as a text front-end for desktop publishing uses.

Building on the past, Amiga word processing began on a high plateau and has been improving ever since. The worst of Amiga word processors is better than the best offered for some other computers. Perhaps the problem is that, having worked with the ultimate in computers, we now expect the ultimate in word processors. And with the progress made in the past three years, we may get there yet. ■

### **Manufacturers**

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# Lattice C++

## OBJECT-ORIENTED PROGRAMMING POWER FOR THE AMIGA

Reviewed by Richard Bielak

The C programming language has been around since the '70s. It was first used at AT&T Bell Laboratories to write the UNIX operating system on PDP-11 mainframe computers. Later C spread widely to other machines. In particular, C has been the choice language for software development on most personal computers—including the Amiga.

Despite its advantages and current popularity, C is a language whose age is showing. In the past 10 years many advances have been made in computer science and programming language design. In order to take advantage of these developments, a new language called C++ was designed at Bell Labs. C++ embodies "object-oriented" programming concepts, while retaining C as a subset. C++ first appeared in mid-'80s and is still evolving.

### **Object Oriented Programming**

As "structured programming" was the trendy catch-phrase a number of years ago, "object-oriented programming" is the hot phrase today. What does object-oriented mean? In general terms, object-oriented programming is simply a different way of thinking about writing programs. Such a way of thinking is often called a "paradigm".

In the conventional programming paradigm a computer program is neatly divided into data and code. The data contains the information and the code processes it. Building a program consists of designing a data structure and then writing the code to manipulate it.

In the object-oriented viewpoint, the data and the related code are tied together into a single "object." The program is constructed by defining objects appropriate for the task at hand and the interaction between these objects constitutes the computation.

As you can see, the difference between the two approaches is not tremendous, both deal with data and code. Furthermore, the object-oriented view seems rather artificial and abstract. Can it really be useful? To see that the answer is "yes," we must consider the problems faced by computer programmers.

The major problem in writing large programs is the management of complexity. One must make sure that the pieces of the program interact in a controlled way, so that an error in one place will not wreak havoc elsewhere. Moreover, the controlled interaction must be preserved when programs are modified—and sooner or later all programs are modified!

The object-oriented approach allows isolation of an "object" from the rest of the program. Since the object's data can only be accessed via the object's functions, strict control of interactions is attained. In addition, if the internal representation of an object were to change, the rest of the program would not be adversely affected. Such isolation of code and data is one of the ways in which object-oriented programming helps in managing program complexity.

Another characteristic of the object-oriented approach is that extending existing objects is just as "natural" as adding new functions in C. When an object's definition is expanded, the existing program will only have to change at the points where the new object is needed. The old code will still work as before. The ability to modify a program in significant ways, without the need for re-writing the old code is of great help to software developers.

### **What C++ Is**

C++ can be best described as a hybrid language (in C programming, C++ is shorthand for the statement  $C = C + 1$ ). It has a number of object-oriented features, but still retains the characteristics of conventional languages. Let's begin our examination

of C++ by looking at a simple example, a program that prints out a "Hello out there!" message:

```
#include <iostream.h>
main ()
{
    cout << "Hello out there! \n";
}
```

In the above program the line **cout** **<< "Hello out there! \n"** performs the output operation. The name **cout** denotes the standard output stream—it is declared in **<iostream.h>**—and **<<** is the "put to" operator. Now, the **<<** denotes the "shift" operator in C. Is there a shift operator in C++? Yes, there is—in fact **<<** is also the C++ shift operator.

The use of **<<** for output and for shifts illustrates the concept of "operator overloading." In C++ it is possible to define an existing operator—like **<<**—to work on new types of objects, as long as such use will not be ambiguous to the compiler. For example, one could use **+** for string concatenation.

Although overloading is important, the central feature of C++ is the concept of a "class." A class defines a type of an object in a way that is analogous to a C structure. An object of a given class is like a variable of a given type in C. However, there are two properties that make classes different from C structures. First, in addition to data fields a class can also "contain" functions—these are called "member functions" of a class. Second, class data or functions can be either private or public. Public elements are accessible to any user of the class, while private elements can only be accessed by the member functions. To be compatible with C, structures are considered to be classes containing only public information.

Below is an example of a class defining a symbol table:

```
class symbol_table {
private:
    int *table_pointer;
```

```
public:
    void insert_symbol (char* s);
    int find_symbol (char* s);
};
```

The private part of the class **symbol\_table** contains a pointer to the table, and the public part declares two member functions that can be used to access the table. Only function prototypes are used to declare the member functions, the actual code is placed elsewhere. The above class definition would be used in a program as follows:

```
#include "symbol_table.h"
main ()
{ // Declare two symbol tables.
    symbol_table table1;
    symbol_table table2;
}
```

Usually, a class will be defined in a so-called header file—**symbol\_table.h** in our example. The code that implements the member functions will be placed in another file. The implementation of member functions is written like this:

```
table1.insert_symbol ("hi");
// Insert symbol into first table
table2.insert_symbol ("ho");
// into second table
void symbol_table :: insert_symbol (char* s)
{
    // code for insert ...
}
int symbol_table :: find_symbol (char* s)
{
    // code for find_symbol ...
}
```

The class name before the function name makes the function a member of the specified class.

In addition to member functions, a class can also have a "constructor" and a "destructor" functions. The constructor will automatically be called when an object of the class is declared. The destructor is invoked when the object is deleted. For example, the constructor for a class

representing a window will open the window when a window object is declared. The destructor, in turn, will close the window.

An important characteristic of the object-oriented approach to programming is the ability to extend a type. In C++ one can extend a class by defining a "derived class." A derived class adds further data elements or member functions to another class—the so-called "parent class." The derived class "inherits" all the properties of its parent class. That is, any member function of the parent can be also applied to the derived class.

Although the private part of a class is usually protected from outside functions, it is possible to define a "friend" function. Such a function can access the private section of a class, as though it were a member. Friend functions are useful when two "unrelated" classes (for example, when one is not a parent of the other) need to interact in a tightly coupled way.

In some cases, when efficiency is of concern, members can be defined as "inline" functions. This way, the function call overhead is eliminated.

### Lattice C++ Compiler

Early in 1988 Lattice introduced a C++ compiler for the Amiga. The **Lattice C++** package contains the compiler, a manual and a book on programming in C++. The compiler and its related files take up two disks. The first disk contains the C++ compiler and linker, the second contains C++ includes, link libraries and a directory full of C++ examples.

As do most of the current implementations of C++, the Lattice compiler translates C++ into C. The C code is then handled by the Lattice C compiler. Four steps are needed to compile a C++ program: C++ preprocessor—**cpp**; C++ to C translator—**cfront**; and two passes of the C compiler—**lc1** and **lc2**. Linking is performed using BLINK—the linker used by Lattice C.

Lattice used the C++ translator developed at AT&T Bell Laboratories.

AT&T's translator produces C code, thereby allowing speedy implementation of C++ on any machine that supports C. The penalty of extra processing during compilations is offset by the ability to give the programmer a more powerful language sooner. I expect that more efficient C++ compilers will be available in the not-too-distant future.

Since a lot of system resources are needed during C++ compilation, Lattice recommends that the compiler should be used on an Amiga with at least 1.5 megabytes of RAM and a hard disk. It is possible to run the C++ compiler from floppy drives, but the compilations would take too much time.

I installed C++ on an Amiga with two floppy drives and 2.5 Mb of memory. To speed up compilations, I placed all include files and all executables (cc, cfront, lc, lc1, lc2, blink) in VD0: (virtual disk). All these files fit comfortably in a 1Mb RAM-disk. The compiler work files, created during compilations, are put in RAM, and all link libraries reside on disk.

I was disappointed that the compiler would not work when it was made resident (I met the Guru while trying this out). A lot of memory would be saved if the executables could be loaded only once (the largest executable—cfront—is over 200K), instead of being copied into RAM from the virtual disk (also in RAM) for each execution.

### Nice Features

Two features of the Lattice C++ compiler stand out as the main strengths of the package. First is the fact the compiler implements full C++ language as defined by AT&T. Second is the supply of class and object definitions specific to the Amiga environment. Definitions are provided for Exec, Intuition, and AmigaDOS objects. Some of these objects are used in *Figure 1*.

To show the programmer how to use all the Amiga related objects, Lattice has provided a number of examples. Some of these are very simple,

like the program above. Others are more advanced. One of the advanced examples is a Desk Accessory Control Program—a program that controls pop-up utilities. Although the supplied examples are helpful, more examples would be better.

### Documentation

The documentation supplied with Lattice C++ consists of a compiler manual and a book about C++. The manual has four chapters and six appendices. The first chapter is devoted to installation of the compiler and the second chapter contains brief introductions to C++ in general and to Lattice C++ in particular.

The next two chapters form the bulk of the manual. Chapter Three is a guide that explains all the options for the C++ compiler and linker. A large section is devoted to explaining overlay facilities of BLINK. The fourth chapter contains brief descriptions and examples of use for all Amiga objects defined in the C++ header files.

The appendices of the manual in-

clude the text of all compiler error messages (without any additional explanations), some pointers on mixing C++ with C or assembler, and the source code for all the programming examples.

The book supplied with the Lattice C++ compiler is "Introduction to Object-Oriented Programming and C++" by R. Wiener and L.J. Pinson. This book is an excellent choice for a first book on C++ and object-oriented programming. The authors explain all the concepts thoroughly and provide a lot of good programming examples.

### The Problems

The major problem with Lattice C++ is the slowness of compilations. The compilation times are especially long if the program uses many of the Amiga-related includes. For example, the Amiga "Hello World" program takes about 90 seconds to compile, while a "Hello World" program that doesn't use any of the Amiga features compiles in 25 seconds. Both of these tests were conducted with all

```
//  
// Hello world — Amiga style  
//  
#include <exec/types.h>  
#include <Intuition/intuition.h>  
const NewWindow nw = { 10, 10, 300, 50,  
    0, CLOSEWINDOW, WINDOWCLOSE | WINDOWDRAG | ACTIVATE,  
    NULL, NULL, "Simple C++ window",  
    NULL, NULL, 0, 0, 0, WBENCHSCREEN  
};  
main()  
{  
    Window *wp = new Window(&nw); // Open window  
    if (wp == NULL) exit(20);  
    RastPort *ho = wp->graphic();  
    ho->move(20, 20);  
    *ho << "Hello out there!"; // Write to a window  
    struct IntuiMessage *msg;  
    msg = (IntuiMessage *) WaitPort (wp->UserPort); // Wait for msg  
    msg = (IntuiMessage *) GetMsg (wp->UserPort);  
    msg->reply();  
    delete wp; // Close window  
}  
//
```

Figure 1

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executables and all includes loaded into VD0:—no floppy disk I/O was necessary.

Since this is the first release of the C++ compiler, such performance is acceptable. But I hope that the compiler will pick up speed in future versions.

Another problem I found was in the error messages produced by the compiler. Some of the messages were quite confusing, especially since they pointed to lines far away from the erroneous code. If the manual had a short explanation of each error, it would be much easier to correct one's programs. This is especially true for programmers new to C++.

Finally, the C++ manual provides no information about the C compiler. In particular, there is no information about what C functions are available to the C++ programmer. For serious work, one must obtain a copy of the Lattice C compiler, if only for the documentation. (*Lattice tells us that free upgraded documentation for registered C++ users should be available by the time you read this. The documentation covers Lattice C library functions, using somewhat modified explanations that better reflect the C++ environment.*—THE EDITORS)

Despite these few shortcomings the Lattice C++ compiler is an excellent programming tool for the Amiga. The Amiga environment is well suited for the object-oriented programming approach and C++. I think any programmer working on the Amiga should consider using C++. Proper use of this language can cut down on development time, both during coding and debugging. ■

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*Richard Bielak is a professional programmer from Brooklyn, New York and a widely published reviewer of Amiga technical products.*

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# Amiga System Programmers Guide

Book Review by Daniel Wolf, Ph.D.

It would be nice if there were a complete Amiga assembly language encyclopedia. Seems I'm always poking through a variety of old articles and the Amiga "official" manuals when trying to learn more of my way around the Amiga's insides. Somehow the information I gather is enough to get me started experimenting. The fragmentary nature of documentation for Amiga assembly language programming is always at least a small problem. Several authors (including myself) have addressed the problem and now there are a few books devoted to it. For starters you should try the "Amiga Machine Language Programming Guide," which I co-wrote for Compute! Books, or "Amiga Machine Language" from Abacus.

These two "machine language" books present 68000 assembly language, Intuition, and AmigaDOS techniques with some graphics and sound. Now the Abacus **Amiga System Programmer's Guide** goes into further depth and will be of most interest to intermediate and advanced programmers. This paper-bound book presents lots more detail on programming the custom chips, the Exec and device-oriented I/O. It could stand as a volume in a definitive Amiga assembly language encyclopedia.

## **Applications vs. System**

What's a System Programmer's Guide? A tradition has arisen in software engineering (programming, that is) to distinguish "applications" from "system programming." The difference (according to tradition) is that applications are end-user programs, like wordprocessors and spreadsheets.

System programming is the other stuff—software which presents an "environment" common to all applications. The team who gave birth to the Intuition system (Amiga's mix of screens, windows, fonts, menus, mouse interaction, gadgets and requester) could be called system programmers. Their work involved lots of direct programming of the custom chips to create an illusion of things happening in various "layers" of the graphics screen.

The makers of NotePad could be called applications programmers. Their work took advantage of the pre-existing Intuition system. Programs such as Digi-View or Sonix don't fit well into these classifications. They are end-user oriented, but rely on custom programmed graphic or sound systems. So what should be expected of an "Amiga System Programmer's Guide?" It should show how to work with the existing low-level hardware and software for such custom-programmed systems.

The book is divided into four main sections—Amiga Hardware, Exec, AmigaDOS and Devices. The hardware chapters include the chip set, interface specifications and keyboard. Each includes pin-outs and block diagrams of chips or connectors. Plenty of tables present the addresses and functions of the hardware registers of the chips. There is also good text discussion of the functions of the custom chips and attention to the differences between Amiga models when necessary. Then follows a lengthy chapter of programming examples for experimenting with the chips yourself.

There's a meaty review of how the custom chip set cooperates to get video onto the screen and then the

first example program—a do-it-yourself COPPER LIST written in assembly language. There's no introduction to Amiga assembly language programming to help you along; you'll need the books mentioned earlier if you've no clue how to hack in Amiga assembler. The System Programmer listings are for those who already know Amiga assembly language and the 68000 instruction set.

That brings me to a digression. Assembly language programming can be presented in a variety of styles—none perfect, but some better than others. Most listings in the System Programmer Guide are stand-alone. They don't refer to the "include files" usually used when programming in assembly. That's good because you don't need the "include files" for any particular assembler to use the listings. It's also bad in this case because some of the listings use hard-coded constants where most programmers use the Amiga "named constant" conventions.

In a few places there are references to fixed addresses which may depend on a system's actual configuration. There is a risk that some of these numbers will change with new KickStart releases or the new 1Mb graphics chips. The Guide is based entirely on KickStart v1.2. Many programmers are already using v1.3. Still, I don't think these problems detract from the utility of the programming examples if you read them carefully. If you already use an assembler these programs will be easy to modify for your "include file" naming conventions. You're free to reorganize them since they're in a common denominator form.

Wrapping up the hardware section are discussions of "half-bright"

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### COMMUNICATIONS

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- #90 Modem Madness! - Terminals include StarTerm, ATerm, and Kermit. Telecommunication utilities such as Archive are also here. Other types of programs and utilities are also included in the price of admission.

### UTILITIES/APPLICATIONS

- #60 AmigaBasic - Two programs that are truly of commercial quality, Cell-Animate and Graphit. Some Deluxe Paint picture files are also included.
- #97 Tutorial Disk1 - A disk full of information and programs to instruct Amiga Programmers and users. Several C & ASM source files are included.
- #98 Tutorial Disk2 - More of the best of Amiga Information.
- #101 Utilities - Many new utilities like Timeset - a time setting utility and DirCopy-a great copier (very quick), and about a dozen more. Some new fonts are also included on this disk.
- #105 Potpourri I - This disk contains several different kinds of programs, some of the highlights are: PopCLI2-evokes a new CLI window at the press of a button; PSound-sample sound recorder and editor; 3-D Breakout; DiskCat-catalogs and organizes disk files; IconMaker-makes icons for most programs so that they can run from Workbench; FKey-template maker.
- #129 Amiga Utilities II - A hard disk backup; Target-sounds a gunshot whenever the left mouse button is pressed; Dpaint Tutor; WinSize-change window size from CLI easily, and lots more.
- #132 Videomaker Utilities - This disk is packed with utilities to make your desktop videos easier to produce and more professional looking.

## THE BEST OF THE REST

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- #135 Applications II - Long Movie-plays several IFF pictures in fast succession, creating animation. QuickBase-a mail manager DBase. Persimil-a DataBase for keeping records of friends, family, associates, customers or employees. MORE.
- #146 Calendar - A very good personal calendar for birthdays, holidays, meetings, bills and other events. Excellent graphics. Calendar program also has a diary. Other programs include some graphics and Checkbook.
- #150 Textcraft+ Demo - A demo of a very good word-processing program of high quality. Menu driven. Has a lot of helps to show you how. Textcraft+ also has a Speller Check available.

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- #94 Diga-View - This one shows the digitizing process in stages. Several good pictures are included. Other programs also included.
- #95 DigaSlide11 - Another in the great series of slideshows with great artwork. Self-running with over 25 pictures.
- #108B Juggler - Famous demo that shows the beautiful graphics of the Amiga and just how powerful this program is. It is easier to run than 108A, but only has the one demo on it.

### GAMES

- #38 Basic GrabBag2 - Around 25 programs of various types. Many of these are must-haves. At less than \$20 each, you can't go wrong!
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- #121 Backgammon - A great game from David Addison.
- #122 Solitaire - Two versions by David Addison.
- #123 Cribbage - Take on the computer or a friend.
- #124 Milestone - A great computer version of Miles Bournes by the author of Monopoly for the Amiga, David Addison.
- #125 Othello - A great 3-D version of this popular game.
- #128 Space Games - Cosmopolis (like asteroids) and Gravity Wars highlight this disk just full of games.
- #137 Blackjack - A full-featured game which allows pair-splitting, double-down, etc. Bandit-play the slot machines without going to Vegas!!! More.
- #141 Dominoes - Dominoes game with great graphics. Also Tic Tac Toe, Drawing and Molecules programs.
- #147 Jackland/Graphics - Adventure clue game. Also some great pictures (graphics), a useful utility called Quickbase, and a fun program called Thingies which you will enjoy!!!
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graphics mode, blitter operation and simple sound control. The explanation of how the chips organize the video and audio output is accompanied with diagrams which account for each clock cycle of a horizontal line of video output. The presentation on blitter function is equally detailed. There is also solid information on the hardware registers for video sprites and the 8520 I/O chips (UART, serial port, floppy disk controller and mouse/gameport).

### The Exec Library

The second section of the Guide deals with the Exec, which has the multi-tasking routines as well as device-oriented I/O, memory and list handling. The first programming examples are related to libraries (opening, closing, creating, modifying, etc.). The Exec examples are a mixture of C and assembler. Some other examples refer to the standard (.h) include files for a C compiler. Short examples show how to create a task, and there's a hybrid program in C and assembler which demonstrates a trap handler. The functions of tasks, signals, messages and ports are presented, too. The rest of this section covers device-oriented I/O and interrupt methods. Here the explanations are accompanied by disassembled listings of some of the KickStart 1.2 code.

These examples are mostly assembly language code fragments demonstrating interrupt handling and the timer-based interrupts. Finally there are chapters on the ExecBase structure which accompanies the Exec library and the mysterious reaches of the hardware/software reset process. The reset software is disassembled with comments to show advanced programmers a variety of "hooks" into the Amiga's subconscious.

The third section on AmigaDOS has more assembly language examples for simple AmigaDOS library calls. Other chapters in this section cover disk layout (boot blocks, cylinders and sectors) and logical disk structure (hunks, directory linkage, and program and data file lay-

out). Another chapter presents IFF format specifications and a useful program example for tracking through an IFF file's "chunks". The last chapters in this section cover the differences between CLI and workbench programs and AmigaDOS I/O with CON: and RAW: windows.

The fourth section is on Device I/O and has chapters with assembly programming examples on the following devices—TrackDisk, Narrator, Serial (RS-232), Parallel, Printer, and GamePort. This section supports the earlier material on device-oriented I/O in the Exec section. It could have sensibly been placed there. Apparently some of the tables for IOSTDREQ and its extensions have misleading or incorrect offsets. Together with the I/O discussions in the Exec section, the discussion of Devices is pretty thorough. A lot of information you might otherwise need to gather from varied sources is combined here. There's one Appendix which lists the Amiga ROM Kernel library routines and their numerical offsets. Some of the information presented as tables in other parts of the book would have been helpful as separate appendices as well (such as the lists of hardware registers and AmigaDOS error messages).

Since many of the programming examples lead us near the secret quarters housing the Guru, it would have been nice to cover Guru message analysis and recovery somewhere. There is also a five-page index.

### Programming Examples

The companion disk contains source and executable programming examples from the book. I ran the copperlist example source through my assembler (ASM68010 by Doug Leavitt, on the companion disk to my assembly language book). First I used MicroEmacs to put all the text in lowercase and change an ALIGN pseudo-op to EVEN. Then I assembled the source using the "-a" feature of ASM68010 to create a finished object load module, since all labels are resolved within the source. It ran and

terminated correctly.

Repeatedly running some of the more exotic ones from the Guide's workbench icons revealed shortcuts. Some of the executables with workbench icons are from sources that don't follow workbench programming conventions. That's okay since they're just examples and some are system-hogging brute force examples at that. The workbench icons are just inappropriate for some of them. I ran the tests on my 68020-enhanced Amiga 1000 with 1.8Mb memory and KickStart v1.2 in EPROM.

How does "Amiga System Programmer's Guide" measure up to my criterion for a good system programmer's book? On the plus side it certainly fills some gaps in the Amiga's assembly language documentation and has plenty of examples of hardware and Exec programming. It has good depth where it counts, is well-organized and brimming with useful illustrations and tables. The prose explanations are easy to read and the English translation is well-written.

On the negative side it is very expensive (\$50 for the book and disk) and it won't really replace any of the "official" ROM Kernel Manuals. It's not a *complete* system programming guide because it doesn't delve into some of the other Amiga system software like the Intuition or the Layers libraries.

To be at home with assembly language on the Amiga, you will still need the set of five "official" manuals and at least one of the introductory books on Amiga assembly language mentioned earlier. But I found the "Amiga System Programmer's Guide" to be a very useful version 1.2 reference and a new volume in my multi-source Amiga assembly language programming encyclopedia. ■

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**AMIGA SYSTEM  
PROGRAMMER'S GUIDE** \$34.95

by Dittrich Gelfand Schemmel 437 pages

Abacus, 5370 52nd Street SE, Grand  
Rapids, Michigan 49508. Optional Disk \$14.95  
(source and executable code). (616) 698-0330

CIRCLE 234 ON READER SERVICE CARD

# Intuition Plus

***Gallery of high-powered C programming routines***

SERIES BY MICHAEL LEHMAN

*C* programmers will put together a collection of building blocks for Intuition programming, with this series. And when you graduate, the routines will come together to create a slick, useful appointment calendar.

(*AUTHOR'S NOTE: I use the Aztec C compiler. I do not know, but expect, that the routines shown here should be compatible with the Lattice compiler.*)

Intuition is the software that makes the Amiga "friendly." It creates and manages the screens, windows, menus and gadgets (scroll bars, buttons, depth boxes, etc.). While Intuition is designed to be friendly on the outside, it is more difficult than you might expect for programmers to make all that power come to life.

Intuition is considerably more flexible than systems for computers like the Macintosh, because the programmer can create many different interfaces. This is possible because Intuition defines less rigid structures and

was designed with color in mind from the beginning. Intuition, however, lacks the "resource" concept present in both the Macintosh and GEM systems. This, combined with Intuition's message-based interface, causes the beginning Intuition programmer to take considerably longer creating a first complete program.

Most Amiga C programmers find that they must create extensive structure declarations and initializations just to get started. These are time-consuming to create and tedious to change—especially in the menu structures.

In this series of articles, the goal is to explain and help you get started with the basics of Intuition programming. Once you understand the building blocks used in Intuition programs, we'll then provide you with

some field-tested C functions for creating, modifying and freeing those data structures. Using these routines takes more code space than creating the structures using C declarations. But it is much faster to code and makes it immensely easier to change your mind as you go.

And at the end of the series, you'll be able to combine the sample routines to make a useful application—an appointment calendar.

## ***Intuition Overview***

Programs that run on the Amiga Workbench use Intuition to create and manage the objects of the user interface. There is a hierarchy of objects and some objects live "within" other objects. For example, a window appears on a screen. The hierarchy of Intuition objects is shown in the following table:

OBJECT	CAN CONTAIN
Screen	Windows, Gadgets, Requesters
Window	Menus, Gadgets, Requesters
Menus	Submenus

Therefore, to begin an application, even one which simply displays text in a window, you must decide:

- 1. Is the program going to run on the Workbench screen or should it have a custom screen? A custom screen is necessary if you want more (or less) than four colors, or if you wish to choose your own colors (a program should never change the Workbench colors on-the-fly). For our sample application we will work in the Workbench screen to start and use a custom screen after we have the program running.

• 2. Is the program going to use menus? Pull-down menus under Intuition are attached to a window. This is unlike the Mac or GEM, where menus are attached to the whole screen. The reason they are attached to windows is that multiple windows from different tasks can be on the screen at one time under AmigaDOS and each task could have its own menu bar.

• 3. Is the program going to use requesters? Requesters are like dialog boxes on the Mac or GEM but, like menus, requesters are attached to a screen or to a window so that a requester from one task does not stop the entire multi-tasking system.

## We chose to build routines that allow us to create the menu data structures on-the-fly.

What we will do in these articles is to create a main program, a simple event handler, make a window, create some menus, try it out (this month) and then create a requester and scroll bars, and finally create a complete event handling function to make the whole program run. We will do this

using the toolbox of routines which I have developed over the past four years and still use in building new Amiga applications such as the spreadsheet PlanIt (formerly known as MaxiPlan).

Let's begin with our main program. An Amiga program has the following outside structure.

### INITIALIZATION:

Opening Intuition Library  
Opening Graphics Library  
Opening any other libraries such as DiskFont, Icon library, etc. that your program needs.  
Creating the screen (optional)  
Creating the menu strip  
Opening the window  
Attaching the menu strip to the window  
Initializing any program specific data  
Setting the wait mask (getting signal bits for each window)

### LOOP:

Waiting for an event  
Extracting the information from the event message  
Processing the event  
Replying to the event message  
If it wasn't a QUIT message,  
GOTO LOOP

(Note: A QUIT message could be a window close, a Quit menu item, it depends upon your application.)

When you finally get a QUIT message:

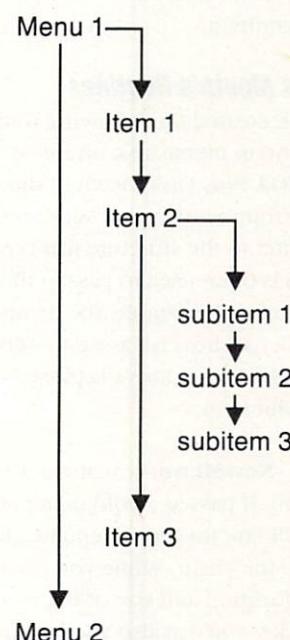
Closing any open windows  
Includes removing menu strips before closing  
Freeing any menu strips  
Closing libraries  
Closing any screens you opened  
Exiting back to the operating system

It's not easy! Now you see why we solved most of these problems *once* and continue to use the libraries we built to make Amiga applications.

The file SampleMain.c on the AMIGA Plus Disk contains the main program described above.

The Menus: Before you open a window, you normally build a menu strip for that window. A menu strip is a collection of menus (left-to-right) that are linked together. Each menu consists of menu items that are linked together and each menu item can contain a pointer to a list of sub-menu items linked together:

### MENU STRIP:



The "hard way" is to build each individual data structure using C initialization statements, giving each a name, and putting the proper names in the proper places to create the link lists. We chose to build routines, similar to those on the Mac, that allow us to create the data structures on-the-fly. This becomes very handy when you realize that for each menu item you must specify its location, width, height, font, text, color, item fill, select fill, mutual exclusion flags, command character, and more!

One additional concept we added to the Intuition standard menu item structure was an handler routine. Each menu item and sub-item contains a long word in which you put the address of a function to handle this menu selection. Therefore, when

a menu event is sent to the application, the event handler needs only to make an indirect function call to the handler in the menu structure, instead of the elaborate case statements and complex logic found in most menu handlers on the Macintosh, GEM and the Amiga.

If you use all of the routines provided you will never need to know much about the additional handler field. We allocate it, fill it in and de-allocate it all for you. We have included the definition of our extended structure as "struct XMenuItem."

### This Month's Routines

We created the following routines (found in menustuf.c on this issue's AMIGA Plus Disk). Each of the creation routines (New or Add) returns a pointer to the structure just created. This is often used to pass to the next routine. For example, the menu header address is passed to AddItem and the Item address is passed to AddSubItem.

- **NewMenu**—Creates a new menu. If passed an old menu header, it will link this new menu header onto the chain. While you can pass in the location and size of the menu header, you can also ask this routine to calculate the position based upon the old menu header.
- **AddItem**—Adds an item to an existing menu. You specify the menu, the handler function, the text for the menu item, the control flags and optionally the command character (used with the right Amiga key)
- **AddSubItem**—This routine adds a sub-item to the menu item that is passed as a parameter. To use this routine you save the result of the AddItem routine and then pass it into each call of the AddSubItem routine.

After you have built the menu strip by calling NewMenu for each menu, and then calling AddItem/AddSubItem to create the list of items under each menu, you can then use the Intuition call SetMenuStrip to attach this list of menus to a window. When you are

ready to close the window (BEFORE YOU CLOSE IT!) you should:

- 1. Call our routine UnMakeMenuStrip, passing the menu strip pointer from the window. This will traverse down the menu tree freeing each sub-item, item and menu header. This returns all of the memory to the system.
- 2. Call the Intuition Routine ClearMenuStrip, passing the address of the window.
- 3. Then close the window.

Note: You do not need to UnMake

**For each menu item you must specify its location, width, height, font, text, color, item fill, select fill, and more!**

the menu strip if you are going to use it again for some other window. Also Note: You must create a new menu strip for each window. If you share a menu strip between two windows you cannot use any check marks or mutually exclusive menu items.

Okay, we have covered the skeleton main program and the creation of menus. Let's devise a sample program and build it from the tools we have created. Our sample program will:

**Open a window  
Let you choose one of three menu items:**

- **Draw String 1**—This will draw the words AMIGA PLUS in the window
- **Draw String 2**—This will draw the words INTUITION PLUS in the window
- **Quit**—This will signal us to close the window and exit

The following Intuition Plus source files as well as a copy of the executable compiled code are contained in the Programming Directory on this issue's AMIGA Plus Disk:

**SampleMain.c**—main program  
**SampleMenu.c**—menu construction routine

**SampleInit.c**—window open, close, etc.

**SampleEvent**.—our event handler for menu events.

**MenuStuf.c**—our menu library

**MakeFile**—drives the MAKE utility program

**SampleProg**—compiled, executable program

**MakeScript**—will compile complete program

Those of you who don't own Aztec's Make utility can compile the program with our included script file (which was created by redirecting Make's output and deleting the lines produced by the compiler, assembler and linker).

We are taking the very simplistic approach in our event handler of just handling menu events. All other types of events are ignored. We will expand upon what other types of events must be handled as we expand our program in coming issues.

If you look at the file, SampleInit.c, you will see code which opens the window. Please be aware that the NewWindow structure we have declared is limited in that it specifies that ONLY menu events are to be sent to this application. Normally there are mouse click events, mouse movement events, window movement events, window sizing events, window closing events, etc. that must be handled in a full program. We will discuss those as we expand the program. ■

---

*Michael Lebman, president of Intuitive Technologies, is the author of the best-selling Amiga spreadsheet MaxiPlan (now retitled PlanIt and published by B.E.S.T.). He can be reached online on GENie as M.LEHMAN1 and on CompuServe as 76164,1764.*

# Games Galaxy

AUSSIE JOKER POKER, STARGLIDER II,  
HOLE-IN-ONE MINIATURE GOLF, DRAGON'S LAIR,  
TETRA QUEST, HYBRIS

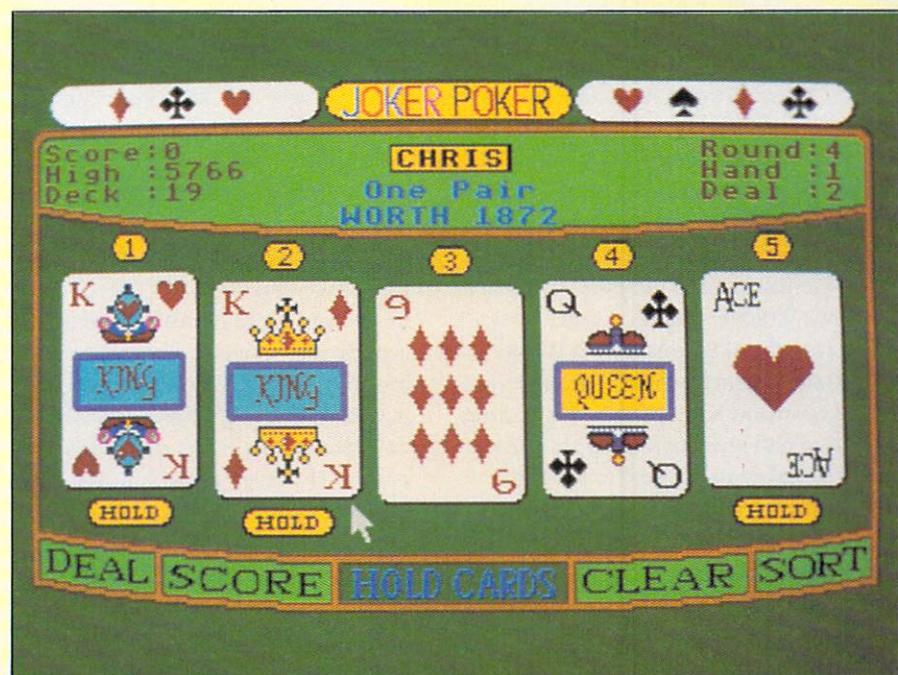
## *Aussie Joker Poker*

**Aussie Joker Poker** offers an interestingly unusual game against two to 90 human players while your Amiga automatically keeps score by Hoyle's rules and tracks the betting. Aussie is different from other poker games I have played against human opponents or computers—the number of times a player may pull cards from the deck and bet during a hand is not the usual raise and call.

Skill is more important than chance in the final tally here. A player is dealt five cards and—with or without betting—can hold or try for better cards with discards through a new deal. Aussie allows as many new deals per hand as you wish, until you bust. But when you fail to better the score from your previous hand, you receive a score of zero—a bust! This is a risk, because the cards left in the deck might just better your hand. And Aussie recognizes that a different suit can better your score.

Aussie starts with the inputting of each player's ID and picking a game format—established by the deck's size per hand. Default is from the seven upward, with three hands per turn. You can also chose the entire deck, two up, 10 up (the smallest), or any combination in between. The number of hands per turn also can be varied.

Aussie also has a password betting system. You can set up wagers at the



beginning of play by typing the betting levels and limits. The program will keep clear and accurate accounts. At the end of the hand or the finished game, it tallies the amount owed to the staying players. It will even balance accounts when one or more of the gamblers decides to call it a day. Aussie updates the final score at the end of each round, putting results in order and rotating the order of play. Everyone playing gets the same chance to better the top scorer.

Whether it's one player testing skills against a bogus name, or a

whole 90 doing their best as a party icebreaker, Aussie Joker Poker is a colorful game that will get the attention of everyone around. Advice will come strong and often. "No, not that card." Maybe Aussie should come with a privacy screen included.

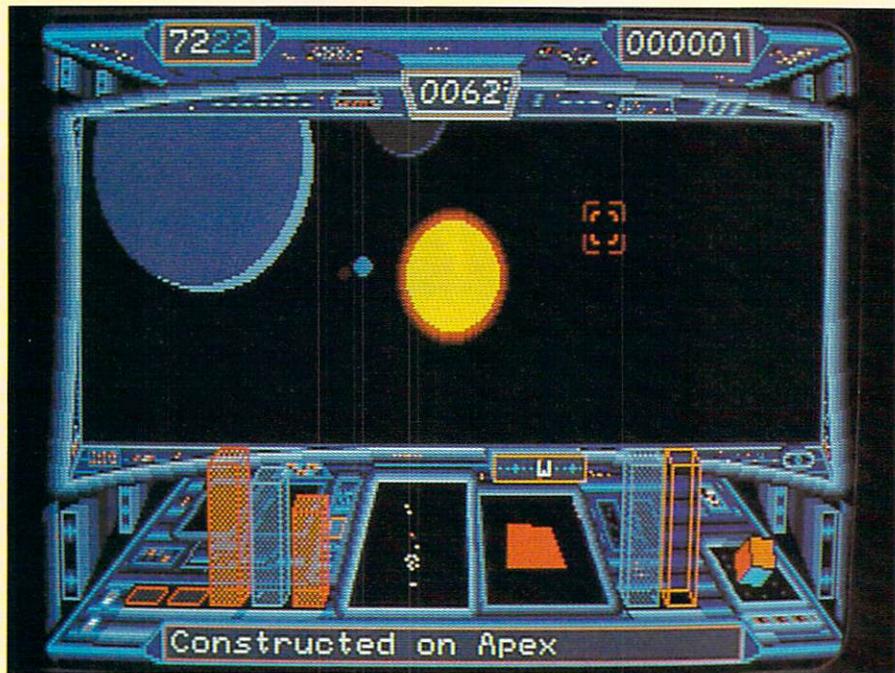
—WOLF GRIFFEY

### **AUSSIE JOKER POKER**

\$49.95

Joker Software International. Distributed by Mindscape, 3444 Dundee Road, Northbrook, IL 60062. (800) 24-JOKER. ■

CIRCLE 217 ON READER SERVICE CARD



## **Starglider II**

When the original Starglider first appeared for the Amiga, it was a marvel of action. Featuring wire-frame 3-D graphics and a cockpit-window view from the space fighter, it also had a stirring story line: Two young scientists had to use the last available AGAV fighter-ship to defeat an invasion of evil Egrons from a far-away solar system. Against incredible odds, Jaysan and Katra prevailed, shooting down the invasion leader in flames.

It takes a long time to rebuild a planet as devastated as Novenia was left by the Egon invasion force. And while Novenia was rebuilding, the Egrons were plotting. In a masterful stroke aimed at revenge, they subdued the nearby Solice system consisting of five planets, most with several moons. They then began to build a strange contraption on the last planet out from the sun—a device to focus a sunbeam on Novenia and fry it to a crisp! Warned of the invasion by a single survivor of the Solice system, the Novenians set about figuring out what they could do to prevent being sizzled by the vengeful Egrons. It is at this point that **Starglider II** begins.

Once again, things are looking desperate for the Novenians. Armed only with a police fighter that was stripped of most of its weaponry in

order to make the deep space jump, Katra and Jaysan set out once again.

Starglider II is a remarkable space adventure with even more depth than the best-selling original Starglider. The ultimate goal is to destroy the device that generates the sunbeam. And for that only one weapon is effective—a neutron bomb. Needless to say, Jaysan and Katra don't have one. They must also deal with defense stations set up on nearby moons. However, not all the Solice resistance has been subdued. Deep in tunnels beneath many of the planets and moons are huge supply depots protected by heavy shielding.

There is also the small matter of finding the scientist who knows how to build a neutron bomb! Thus, besides battling a determined and numerically superior enemy, the heroes of Starglider II must succeed at what amounts to a scavenger hunt in space.

The graphics of Starglider II are even better than the original. The wire-frame graphics have been replaced by solid-filled shapes, yet the movement is even smoother than in Starglider. The out-the-cockpit viewpoint is still available, but many additional views can be called up. The Icarus control panel has simulated 3-D columns which indicate the

energy levels of various weapons and shields. The mouse control works much as in Starglider, with the two buttons being used along with mouse motions to control velocity, heading, and weapons. The joystick is also fully functional, and sometimes flying the Icarus is easier with the joystick, especially in the underground tunnel network. A full range of keystrokes must be learned, for such things as switching weapons, turning the tractor beam on or off, and identifying objects.

Included in the package are three pamphlets. The first is a short novella by the noted science fiction writer James Follett. Study this *carefully*—it is full of clues and hints on what to do and when to do it. You must enter a word from this novella when you first start a game. The second pamphlet describes the Solice planetary system, including such noteworthy landmarks (spacemarks?) as the giant planet Millway and its seven moons.

The last pamphlet is the loading instructions and a summary of keyboard controls. This pamphlet also warns that non-standard hardware configurations may not work with Starglider II. This, unfortunately, turns out to be true. For example, the program absolutely refused to boot on my Amiga 1000 as long as I had the C-Ltd Clock attached.

Except for the incompatibility problems, Starglider II is a superb action and adventure game. It is fun to play (be prepared to play awhile—you can save games), has excellent graphics and is challenging in the extreme. Highly recommended.—

DAVID PLOTKIN

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### **STARGLIDER II**

\$44.95

Rainbird Software, 3885 Bohannon Drive, Menlo Park, CA 94025. (415) 322-0412. ■

CIRCLE 218 ON READER SERVICE CARD

## **Hole-In-One Miniature Golf**

Miniature Golf is a great sport. It is such a simple game, and that simplicity should make it an easy sport to simulate on the computer screen. But most computer versions I've seen don't seem to feel that miniature golf

is exciting enough to sell. So instead there have been cartoon-like players jumping into the air after a good shot or breaking clubs over their knees after bad ones.

**Hole-In-One Miniature Golf** is not a perfect entry into this field either, but it is a step in the right direction. The tone of the program is neither too staunch (after all, this isn't the PGA), nor is it too silly (after all, we are growing up a bit as computer gamers, aren't we?).

What you get is a program that allows you to see the hole from any angle, play the shot at any angle and at any strength, and view the scorecard with a couple of clicks of the mouse.

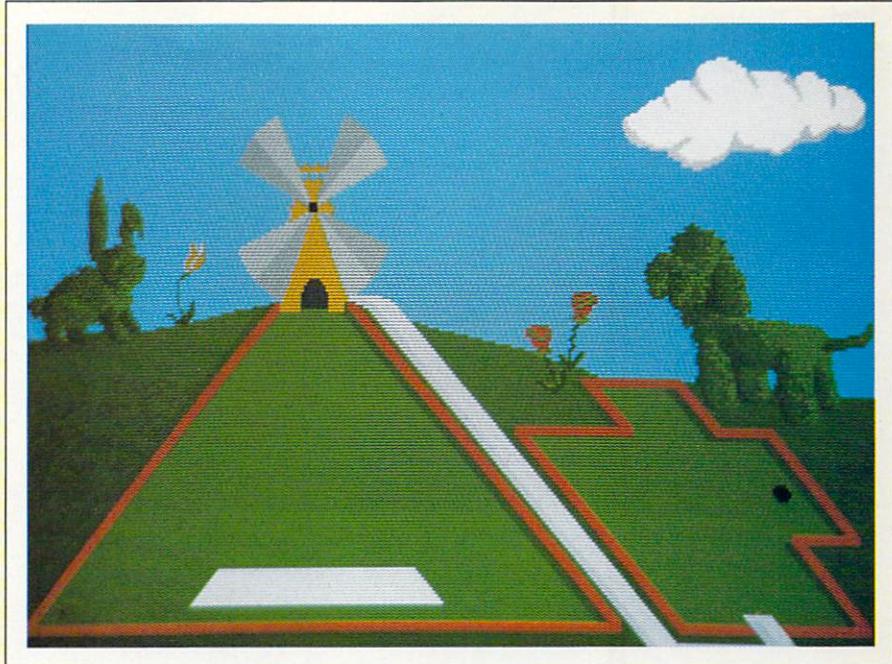
The program is controlled with the mouse. At the beginning of each hole you move the mouse to position the ball on the tee mat. Then the mouse will draw a line out from the ball in the direction you want the shot to travel. It also controls the strength of the shot. The longer the line is drawn, the stronger the stroke. Another tap of the mouse button sends the shot on its way.

There are pull-down menus at the top of the screen that uncover options like seeing the contours of the hole from four different views, or viewing the scorecard. There is a replay feature for seeing a shot again, and if you're playing solo you can retry a particularly horrible effort without having to tell anyone. It is also possible to print out the scorecard from a particularly enjoyable round.

After the game becomes a bit easier for you, try the expert difficulty level. At that setting there is no line coming out from the ball to help you aim your shots.

There are four regulation 18-hole courses in this two-disk package. For novice miniature golf players or new computer gamers, there is also an 18-hole tutorial course that explains the features of the game and how each relates to miniature golf.

But, as I stated, this wasn't a perfect program. Alas, no golf program can be perfect without the ability to create your own holes and courses. No golf program can be complete



without some type of Hall of Fame to save the top scores to disk.

Overall, I like this program as the best miniature golf simulation I've yet seen. There's still more ground to cover, but these improvements on what's already on the market are encouraging.—RICK TEVERBAUGH

#### **HOLE-IN-ONE MINIATURE GOLF \$39.95**

Digitek Software, 8910 N. Dale Mabry Executive Centre, Suite 37, Tampa, FL 33614. (813) 932-4564. ■

CIRCLE 219 ON READER SERVICE CARD

#### **Dragon's Lair**

So you think you're the hottest joystick jockey on your block? Well, Dirk the Daring is back in town and he needs your help rescuing Princess Daphne from the evil magic of Singe the Dragon. Don Bluth's **Dragon's Lair** was the classic arcade game that first used laser disk video graphics. It has now been brought to the Amiga by Readysoft in a six-disk package containing 160 megabytes.

Your control of Dirk has only five basic motions—forward, back, left, right and sword swing. And the game acknowledges all your moves with an audible response tone. Operation is not simple—because in critical moments absolutely precise action is required. One slip on the keyboard or

joystick and Dirk dies again.

For example, the very first thing you must do is get our hero over a drawbridge. As Dirk boldly strides across, he falls through the rotting bridge and catches himself. Suddenly the moat monsters are curious about Dirk. Now you must decide if Dirk should defend himself or scramble up the hole. Stay calm and don't confuse our hero with too many actions. To save Dirk, you must tell him to swing his mighty sword once and then in midstroke switch him to climbing. If you tell Dirk to fight and scramble up the hole either too quickly or too slowly, the moat monsters will enjoy hero sandwich.

You'll be crossing that drawbridge many times. Any miscalculation will cost you one of Dirk's three lives and send you back to the beginning of the current obstacle. But after Dirk dies the third time, you'll find yourself back at the beginning of the game. There is *no* way to save your Dragon's Lair games.

If you think that Dragon's Lair is a pattern recognition game, you're on the right track. As the game goes on, the patterns increase in complexity, the decisions get harder, the amount of hints and your time for a decision decreases. Dragon's Lair is harder than any other pattern recognition game I have ever played.

# FALCON



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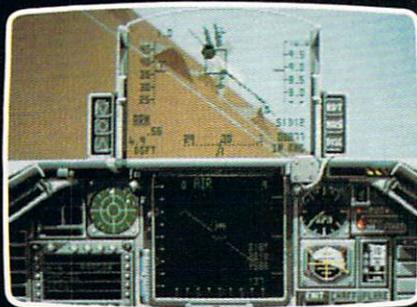
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CIRCLE 026 ON READER SERVICE CARD



Amiga & Atari ST screen

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**Spectrum  
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If you make a wrong move in MouseTrap or Pac-Man you can usually survive, but not in Dragon's Lair. And you are not given much time to recognize a scene. When Dirk goes down the rapids, the player must choose within a couple of seconds which of the river's two forks (both difficult) Dirk should travel.

Visionary Technologies did all the impressive programming and digitizing. The game requires one megabyte to run on the Amiga 500 and 2000. But on the 1000 it only requires 512K. This is accomplished by utilizing the Writable Control Store (WCS). The WCS is the 256K of RAM that normally can only be accessed by Kickstart. This means, in effect, that Dragon's Lair is using *all* of the 1000's 768K RAM.

The file handling uses the multi-tasking aspects of the Amiga. While actions are happening on the screen, the disk drives are busy loading the next required pieces of information. These technical feats are not without a couple of drawbacks. Sometimes in the middle of gameplay the program will pause to finish loading the rest of a scene. Another sacrifice for the impressive graphics and sound is the LONG load time between each obstacle. For each 15 to 25 seconds of gameplay you must wait as long as one minute for a load. (Dragon's Lair is copy-protected. You can load it into your hard disk only if you're willing to re-partition the drive and put in a 10Mb section for the game.)

Dragon's Lair graphics are in high resolution, not HAM, with true overscan. Visionary Technologies provided selectable interlace, for enhanced graphics, which looked truly mind-blowing when I saw it displayed in-store on a multi-sync monitor with a Flicker Fixer board. The characters moved with a surprising amount of fluidity. Even Dirk's facial expressions have been captured.

Dragon's Lair sound effects and music are so good that while slashing my way towards Singe the Dragon, I would sometimes make deliberate mistakes at parts of the game where I had not died, just to find new sounds.

Dragon's Lair is definitely a game to add to your Amiga collection. The blazing realtime graphics, digitized stereo sounds and challenging gameplay do a lot to make up for those loading delays. Visionary Technologies and Readysoft have done Don Bluth justice. Now I just hope they sell enough games so that they'll do an Amiga version of Space Ace, Don Bluth's second laser disk game. Meanwhile I'm still trying to rescue Princess Daphne and waiting for each scene to load with heavy sword and sweaty joystick. ■ R.F. NOYES

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**DRAGON'S LAIR \$59.95**

ReadySoft Inc, P.O. Box 1222, Lewiston, NY 14092. (416) 731-4175.

CIRCLE 220 ON READER SERVICE CARD

**Tetra Quest**

**Tetra Quest** is a strategic game with superb graphics and just enough action to make it interesting. It emphasizes problem solving and is a lot of fun to play.

In Tetra Quest, the six Phoenix tablets have been stolen and broken up into 64 pieces each, then hidden in the Tetra Dome. Your mission is to recover all 384 (!) pieces so that the Galactic Games can be held.

Using your joystick to recover each piece is not simple. First you must pick up four gold coins, each on its own screen. You can move from one screen to another through designated exits. The coins must be picked up in order, but are not all accessible. Your Tetra runner can only move on the tracks making up each screen—except under special circumstances.

Some of the coins can only be reached by going through teleports, which move your runner to another area (perhaps on another screen). Your way may also be blocked by gates, which must be rotated into the proper position before you can reach your destination.

Each gold coin picked up gives you "Phoenix Power", which can be used to temporarily free your runner of the tracks so that he can fly across and pick up gold coins or the frag-

ment of the Phoenix tablet. If you have enough power, you can use a rather complex series of keystrokes to temporarily become a Phoenix.

If you manage to pick up all four coins, the piece of the Phoenix tablet becomes visible. It is then up to you to figure how to get to the piece and pick it up.

Through all of this, "spitters" are spitting out all manner of aliens who will track you down to prevent you from recovering the Phoenix tablets. You have a gun which obliterates these aliens, but some can make your life miserable even after they get blasted.

There is a lot to like about Tetra Quest. The graphics and music are very sharp, and solving the screens can be quite a challenge. Every fourth level you get a password, so that you can start right from that level the next time. High scores are saved to disk. Controlling the Tetra runner with the joystick is a little tricky, but not difficult. I like this game, and I think you will too.

—DAVID PLOTKIN

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**Hybris**

Every dedicated aracker should have one scrolling space shoot-'em-up. The problem is deciding which one, because typically the similarities far outweigh the differences in games of this type. You want it to have everything going—great graphics, sound, and playability. **Hybris**, from Discovery Software, is just such a game.

In Hybris, you play the pilot of a scout ship launched from a mother ship in orbit over a planet which has been overrun by aliens. The colonists were captured and imprisoned, so your ultimate goal is to find the holding camp and free the captives. Your more immediate (and more realistic) goal is to stay alive as long as possible while blasting anything that

moves—and anything that doesn't.

The Hybris opening screen allows you to set the difficulty of the game—how many ships you are allowed (up to nine, and there doesn't seem to be any way to get extras), how often the enemies fire at you, and the variables controlling how often you can upgrade your ship.

Your ship starts out at level one with adequate speed and wing cannons, and little else. As the game progresses, the mother ship drops upgrade pods, which you can shoot and fly over, bringing your ship to the next level of power. Level five (the highest I've seen yet) is truly awesome. You can fire in about eight directions at once and are heavily shielded from enemy attack. Even the enemy "level guardians" (more on these later) are no match for a level five ship.

Under most circumstances, if your ship is hit by enemy fire, it drops back one level. So building up your ship level is also an excellent way to get extra playing time. At level zero (one down from your starting level), if your wimpy little ship with just a nose cannon gets hit, you lose one life. Some enemy weapons will destroy you completely, no matter what level ship you have.

After selecting which of the two commanders you want to be (there doesn't seem to be any difference between them), you are launched over the colorful scrolling surface of the planet. Using either your joystick or the mouse for control, you fly around blasting enemy ground installations and aircraft that rise to do battle.

The ground installations change from level to level. The higher you go, the more hits are required to destroy them. At level one, there are gun emplacements which explode in a single hit. Level two adds submarines, which can be destroyed with a single hit but can submerge to avoid you. Huge enemy ships launch choppers and carry heavy gun emplacements that take two or three hits to destroy. Level three adds huge spiders and "hearts" which take mul-

tiple hits as well.

The enemy aircraft will fire at you—and try to ram you. In the upper levels there are more of them and their flight patterns get harder and harder to avoid. Periodically, a formation of large ships appears. Their shells will completely destroy you.

The most difficult enemy to deal with is something I call the "level guardian". It is huge—almost a third of the screen wide—and shoots a variety of weapons at you. The instructions don't give a clue as to how to deal with these guardians, but they seem to be in three parts, and the "wings" must be destroyed before the center is vulnerable. If you have a level four or five ship, you can bore straight in and blast away. It is *almost* impossible to destroy a level guardian with a level one ship, but it can be done with some pretty fancy flying.

Two guardians lurk on each level. The first appears about halfway through the level, the second at the end of the level. Killing this second one moves you to the next level.

Your ship has some very capable weaponry. Each level of ship gets more powerful cannons, and you can "break" your ship into a different configuration with the lasers more widespread, or fire in more directions, depending on the level. Parts of your ship form shields which are impervious to enemy fire. Some enemies are better dealt with in this configuration, and enemy air attack in the upper levels virtually requires some shielding.

You are equipped with three "smart bombs" which make one hit on all enemy installations/aircraft on the screen. These are very effective in helping you survive the level guardians. Just remember not to waste them. You only get three per ship.

There is a lot to like about Hybris. The graphics and animation are quite good and the sound is incredible. Piped through a pair of stereo speakers, the soundtrack is good enough to dance to and the digitized explosions are satisfying in the extreme.

This game is also very playable—

you can set the degree of difficulty from the opening screen. You can continue from where your last game ended, which makes it possible to see the upper levels without having to start from the beginning every time. However, you must start from the beginning each time you begin a new play session. High scores are saved to disk, although the manual doesn't explain how to add your initials to the scoreboard and I could never figure this out at all.

Unfortunately, there are some minor bugs in the program. When using the mouse for control, rolling it quickly can cause your scout ship to hang up—it won't move across the screen even though the mouse is moving in that direction. The manual says that pressing the right mouse button will break the ship into its new configuration. But actually, pressing the right mouse button seems to fire a smart bomb.

When using a joystick, you must push the SPACEBAR to release a smart bomb, and rotate the stick to break into the new configuration. Unfortunately, rotating the stick sometimes fires a smart bomb instead, and occasionally a smart bomb goes off for no reason at all (both with the mouse and joystick controls). Ordinarily, the mouse would be a better control mechanism, because it leaves one hand free for the keyboard—oh, my poor SPACEBAR. But the joystick will result in better scores because that @#\$%^ ship doesn't move the way it should under mouse control.

But the bugs are more a nuisance than anything else. Overall, the combination of excellent playability, sound and graphics combine to make this game an outstanding value, and a prime candidate to be added to the collection of anyone who wants a scrolling space arcade game.—DAVID PLOTKIN

#### HYBRIS

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# Introducing Exec I/O

## Assembly Language Secrets You Won't Find in the Manuals

SERIES BY DANIEL WOLF, PHD

*Learn how to unlock Amiga special features with assembly language.*

When a friend started showing me how to work with Amiga assembly language, I was at first delighted and confused. I was used to working with 6502 assembly language on the Apple II, Commodore 64 and VIC 20. Because those 6502 computers have small, fixed address spaces and no multi-tasking, the style of programming was simple and straightforward. For example, if a program needed a table of data it was simple to know the actual memory addresses of the table's contents. With the Amiga I was struck immediately by the transformation of programming style.

Because of Amiga's multi-tasking, the notion of fixed addresses for most programs and data went out the window. Most addresses in an Amiga assembly language program are entirely arbitrary and depend on a loader program to adjust them when the program is run. That means a higher level of abstraction for labels used in a source program. Of course labels mean everything in assembly language, but an assembled 6502 program for an Apple or Commodore system shows actual addresses in the assembly listing. Not so with the Amiga. The biggest mental hurdle I had to leap was always programming in ignorance of a fixed memory map.

My first Amiga programs used

mostly the Intuition, AmigaDOS, Graphics and Math libraries. They made very limited use of the Exec library beyond simple memory allocation and de-allocation. The Exec WAITPORT and GETMSG routines became familiar because of their frequent use for keeping track of input "messages" (menu selections, mouse clicks, etc.) to Intuition windows. I read the Exec manual, but most of the Exec functions seemed esoteric or complicated. It was simpler to rely on AmigaDOS to handle ASCII text I/O with a CLI window or printer.

But Exec has much more than just routines for managing memory. It is the core of the multi-tasking operation of the Amiga. Exec routines can send messages between tasks and manage I/O with a family of similar libraries of routines called "devices." Each device is organized like a library. The similarity is that each of them has a known subset of routines including READ, WRITE, etc. There is a "trackdisk.device" for the floppy disk system, a "serial.device" for the serial port, and others.

For many months it was hard to find much information about Amiga assembly language programming. But by now there are plenty of articles and several books which teach assembly language techniques for exploiting the Intuition and AmigaDOS libraries. There are now also many Amiga assembly language programmers used to the notions of structures, opening libraries, calling ROM kernel library routines and so on. It's time to turn some attention to the

Exec library and its I/O devices. First we'll look at the "printer.device," a family of routines Exec can use to send output to a printer. Experimenting with I/O using Exec's devices is a good way to get acquainted with some of its powerful capabilities.

### IOSTDREQ & MESSAGEPORT

In order to use the printer.device we'll need to make some preparations and understand how to start and stop the I/O operations. We need to use a couple of structures and understand how they function. The first is an IOSTDREQ. All Amiga device I/O is handled using IOREQUEST structures. There are several types of these, but they're all based on a standard prototype called IOREQUEST. The simplest extended one required for certain devices is called IOSTDREQ. Some printer IOREQUESTs may be larger than an IOSTDREQ. They may need "extensions" to the IOSTDREQ.

In our simple example, a IOSTDREQ will work fine. The other structure we'll need is a MESSAGEPORT to receive "done" messages when the "device" is finished with an I/O job. Figure 1 shows the IOSTDREQ and a MESSAGEPORT structures:

Both of these structures start with a complete LISTNODE structure (the first 14 bytes of each). While we won't go into much detail about their functions here, keep in mind that IOREQUEST structures and MESSAGEPORT structures can be elements of lists. The LISTNODE struc-

tures embedded in them let Exec routines manipulate them when there are many related structures hooked together in linked lists. We'll explore the LISTNODE, MESSAGE and MESSAGEPORT structures more thoroughly in future articles.

On first glance at these structures you may think there's a lot to master before trying device-oriented I/O. The IOSTDREQ structure looks a little daunting because it contains a complete MESSAGE structure (which contains a LISTNODE structure). Because the printer I/O example is only for output, the message-passing features of device I/O programming are minimized. That helps make the printer device a good first Exec programming exercise. We can look at all the basics of device I/O without first becoming experts on Exec messages and lists.

For now, just keep in mind a simple notion of an Exec message. Remember from Intuition programming that a window has an IDCMP (Intuition Direct Communication Message Port). User interaction with an Intuition window is reported automatically to the IDCMP. WAITPORT and GETMSG (routines in the Exec library) let the program await a message's "signal" and then get hold of the message. Very simple Intuition programs can use the IDCMP just to report that the user has clicked a closewindow gadget. The MESSAGEPORT structure attached to the IOSTDREQ plays a similar but more limited role. Its most important function is to report to the "host" task that the I/O is finished.

An IDCMP is automatically created for you whenever you open an Intui-

tion window. When we want to do I/O using Exec routines, we have to create the MESSAGEPORT and attach it to the IOSTDREQ structure "by hand".

To perform printer text I/O we'll need to OPEN the printer.device and use it to send an output (CMD\_WRITE) command to the printer. Opening a device is just a little different from opening a library. To open a library, a simple call to OPENLIBRARY with a pointer to the library's name suffices. To open a device we must first have a properly prepared IOREQUEST as well as a pointer to the device name. The device becomes attached to the IOREQUEST (the IO.DEVICE field becomes a pointer to the device's library of routines). That IOREQUEST must have an attached message port for the reply messages. Here is the sequence of steps required to get the whole job done:

1. Create a MESSAGEPORT to "signal" our task that a message has arrived.
2. Create a IOSTDREQ (more complex examples would need extensions here).
3. Link the MESSAGEPORT to the IOSTDREQ (to receive the "reply" messages from the printer.device I/O routines).
4. Call OPENDEVICE to attach the printer.device to the IOREQUEST.
5. Put a CMD\_WRITE command and a pointer to the text into the IOREQUEST and call DOIO (or SENDIO, see below).
6. Wait (if necessary; see below) until the I/O is done.
7. CLOSE the printer.device.
8. Free the memory and signal resources of the MESSAGEPORT.
9. Free the memory of the IOSTDREQ.

Now there's one more obstacle to

<b>Structure</b>	<b>Size</b>	<b>Offset</b>	<b>Field Name</b>	<b>Comment</b>
<b>IOSTDREQ</b>				
	LONG	0	Successor	ListNode element
	LONG	4	Predecessor	ListNode element
	BYTE	8	Type	ListNode element
	BYTE	9	Priority	ListNode element
	LONG	10	Name	ListNode element
	LONG	14	MSG.ReplyPort	Pointer to reply MESSAGEPORT
	WORD	18	MSG.Length	Length of MESSAGE data
	LONG	20	IO.Device	Pointer to the DEVICE
	LONG	24	IO.Unit	Some devices have >1unit
	WORD	28	IO.Command	e.g. CMD_WRITE
	BYTE	30	IO.Flags	
	BYTE	31	IO.Error	Look here if DOIO fails
	LONG	32	IO.Actual	True bytes sent/received
	LONG	36	IO.Length	Desired # bytes for I/O
	LONG	40	IO.Data	Pointer to I/O data bytes
	LONG	44	IO.Offset	
<b>MESSAGEPORT</b>				
	LONG	0	Successor	ListNode element
	LONG	4	Predecessor	ListNode element
	BYTE	8	Type	ListNode element
	BYTE	9	Priority	ListNode element
	LONG	10	Name	ListNode element
	BYTE	14	MP.Flags	Kind of signal to send
	BYTE	15	MP.SigBit	Bit to use as signal
	LONG	16	MP.SigTask	Task to be signalled
	LONG	20	MP.MsgList	Linked list of messages

FIGURE 1

# BASIC MasterMind

**Colorful, easy-handling version of the classic game**

PROGRAM BY ARNIE CACHELIN

AMIGA Plus Technical Editor

Just about everyone has played Master Mind, or at least knows about this popular pegboard game of logical deduction. The concept of the game is centuries old. It was played in old England as Cows and Bulls and more recently as Code-Breaker. One player picks four different colors out of six, in a particular order. The other player must guess which colors were picked, and in which order.

With its simple, logical format, Master Mind seems designed to be a computer game. The computer makes the perfect second player.

The AMIGA Plus Disk version is designed to play just like the peg game. On your screen you will find a board filled with eight rows of four boxes each. To the left, a bar of six colors fills the screen. Click on one of these colors to activate it, then click on the box you want to fill. If you change your mind about a guess, just refill the box with another color.

Once all the boxes in the bottom row are filled, click on READY, and the results of your guess are shown in the box next to that row. If you have four of the six colors in your guess, at least two of the colors have to be correct. If two colors are correct, but in the wrong places, two white boxes will appear. If two colors are correct, and in the right positions, two black boxes will appear—but you will have to make more guesses to figure out which two squares were correct. The computer's response tells you only that some of your squares are correct, not which ones.

## Winning Strategies

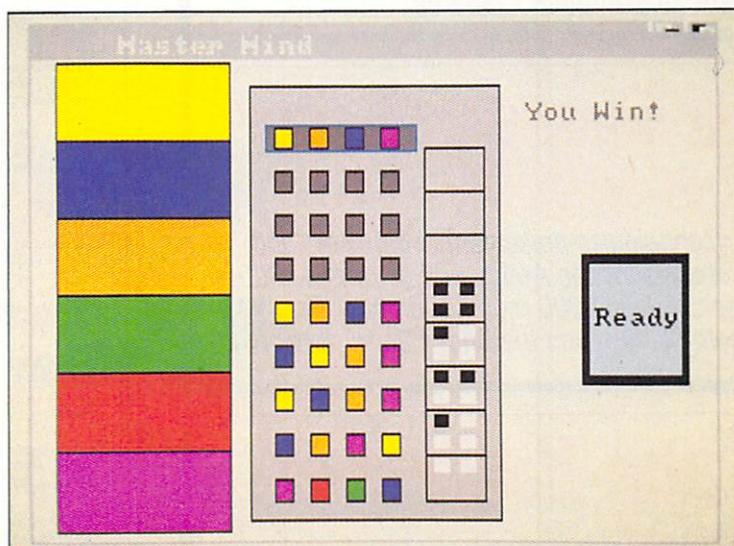
Strategies vary. Some players prefer to have four different colors in every guess. If that gets confusing, you can try to eliminate a few colors at the start. If all four squares in a row are filled with red, the answer will tell you definitely whether or not red is one of the colors you're looking for. If it is, however, you've still got to determine its position—and three more colors.

The game gives you eight tries to guess a combination. Included in the pull-down menu is a PEEK option. Each time you select this option, one square of the answer will be revealed. GIVE UP lets you see the answer, while leaving your guesses on the board. Once you know the answer, it's easy to work backwards and see where you goofed, and what sort of moves work best.

## About The Program

The game is written in Amiga BASIC. To run it, you will have to copy it over to a disk with the Amiga BASIC Interpreter, such as the Extras disk that came with your Amiga.

While no paragon of programming style, the game illustrates several techniques worth noting. Overall, the style is as modular as could be conveniently managed. Subroutines handle all of the program functions. Two subprograms conveniently handle some display routines. The technique of polling for mouse clicks used here can cause problems on a multi-tasking system, since it will keep taking clock cycles from the computer even when you're not actually playing. It is better to use the ON MOUSE and SLEEP commands, instead. ■



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**PREMIERE ISSUE!**



# Amiga Desktop Video

*Starter kit for the ultimate computer graphics*

BY MATTHEW LEEDS

**F**rom genlock to ray tracing—an overview of what you'll need to get started creating high-quality video animation on your Amiga.

The Amiga is it! Do you want to do animation, business presentations, video titling, scientific visualization, special effects, digitizing, interactive educational productions? If the job needs video, use an Amiga—the most

cost-effective solution. The Amiga's video software is the best, most diverse, and easiest to use. In short, the Amiga is it!

Now that we've got that straight, let's move on and take a look at what you need to work effectively with video on the Amiga. The first thing you need is an Amiga. If you already have one, congratulations, you made the right choice. If not, run out and buy one, I'll wait.

Throughout this article, I will be mentioning many of the most widely used hardware and software packages for video applications. These products are by no means the only ones available in their respective categories, and new products are arriving on the market all the time.

(Starting in the next issue of *AMIGA Plus*, a series by Lion Kuntz—author of this month's Color Cycling article—will make detailed comparisons of the products in each category of Video Software and Peripherals.)  
—THE EDITORS)

## **Video 101: Basic Concepts**

To make your best decisions on what additional hardware and software you need, you need to understand the basics of how video works. So we'll cover that before moving on to Amiga specifics. You should read this section if you are not already familiar with the formats of the many different types of video—television video (the U.S. format is NTSC) and computer video (RGB analog, RGB

digital, or in the IBM world CGA, EGA, VGA, etc.).

All video has certain basic similarities. An electronic signal containing varied pieces of different information directs the movement of an electron beam across the inside face of a cathode ray tube (CRT or picture tube). The inside tube face is coated with phosphors that glow for a very short fraction of a second when struck by the electron beam. The beam draws an image on the CRT one line at a time, left to right, then moves back to the left end and goes slightly downward to draw another line. This continues until it reaches the bottom of the screen. The beam then moves back to the top left corner and starts over again.

Naturally the beam is not left on all the time. If it was, every time it moves from right to left it would draw on top of what it already wrote. The same consideration applies when it moves back from the bottom to the top. To control these on/off cycles, horizontal and vertical synchronizing signals are used.

When television video was first created, all television was black and white. The invention of color created a huge debate. Should color television video remain compatible with the existing black and white sets (at the cost of a lower quality image) or should a new system with improved image quality be used. The decision was to maintain compatibility and accept a lower quality image. (As a interesting aside, a similar debate is now going on over the introduction of High Definition TV into the United States, and at this point in time the FCC has mandated that any new HDTV system must remain compatible with the existing system).

The National Television Standards Committee standard for color television (NTSC) essentially created a second signal imposed on the basic black and white signal. The black and white signal became the luminance (brightness) portion of the image, and the new color signal was superimposed on top of this as a subcarrier. The older TVs ignored the

subcarrier and only showed the luminance image as a black and white picture. This combined signal is called composite video.

Let's go back to the horizontal and vertical sync signals discussed earlier. As the electron beam draws each line of the image, the phosphor glow begins to fade, the moment the beam passes. If the beam tries to draw too many lines from top to bottom, the top of the image will have become too dark by the time the beam gets back to the top. If you use a different set of phosphors that glow for a longer time, any moving portion of the image will develop smears or ghosts—because the new image is drawn before the old is completely faded. A compromise between phosphor lag time and beam speed must be reached.

The NTSC compromise "interlaces" two sets of images. The electron beam draws line number one of an image, skips line number two and draws line number three. All of the odd numbered lines are drawn, then the beam moves back up almost to the top and draws line number two, skips over line number three and draws line number four.

Each set of lines, odd and even, is called a "field." Each pair of fields completes a "frame." Thirty frames are drawn each second. The persistence of human vision lets this interlaced system work most of the time. It is aided by the fact that in nature there are very few high contrast images, and that edges normally appear blurred.

Occasionally the illusion breaks down. Take a look at television advertisements that use computer generated graphics. Look closely at thin horizontal lines. Notice how they flicker. Look closely at high contrast edges, notice that they shimmer and flicker as well. This is caused by lines that occur only in one field. They fade out completely before they are redrawn.

In NTSC video the color information is carried as a single signal called chroma. In computer video the color information is made up of three sepa-

rate signals—Red, Green, and Blue (RGB). NTSC video is broadcast over the airwaves and is restricted to a specific radio frequency bandwidth. Computer video is carried directly over a multi-wire cable and is limited only by the bandwidth of the computer and receiving monitor. These two factors—mixing the color information and a narrow bandwidth—limit the quality of the color portion of an NTSC image.

### Amiga Video Hardware

The first Amigas manufactured offered a NTSC color composite video output, although the quality of this output varied considerably. The Amiga 500 and 2000 offer only B&W composite video. All Amigas do provide an RGB port. If you want to produce NTSC color video from your Amiga you will need to connect a device that converts this RGB information into NTSC color video. This device is known as an **encoder**.

There are several encoders on the market specifically for the Amiga. C-LTD's C-View, the V-I series from Creative Microsystems Inc. and Commodore's 520 Video Adapter are a few possibilities. All are generally priced below \$100 and all are suitable for home use. They will give you a signal that you can record on a VCR or camcorder or display on a video monitor. There is a considerable difference in quality between a \$100 encoder and the four-figure encoders used in professional television production. Don't expect broadcast quality at these prices.

If you are looking for a better quality encoder you might consider something known as a **genlock**. These devices also offer the ability to mix the Amiga's video signal with that of an outside video signal. This is known as "keying" in video terminology.

A genlock's function is to lock the timing of the Amiga's video to that of an external video signal. Imagine a monitor attempting to display the results of two mixed video signals that were not synchronized together. One signal tries to make the electron

beam start drawing a new field while the second signal is still in the middle of one of its own fields. Chaos results. The horizontal and vertical sync signals as well as several others must be in exact accordance with each other.

Amiga-specific genlocks also offer the ability to replace a portion of the Amiga's graphics with an incoming video image. The Amiga stores information in "registers" about the colors it is currently using in a graphic image, each register holds a single color. Every dot (pixel) on the screen is linked to a specific register. By changing the color stored in a register you can change the color of every pixel linked to that register. It is also possible to display incoming video in place of color for specific registers.

Inexpensive Amiga genlocks will only show video in place of the first register, known as COLOR 0. More sophisticated genlocks offer as an option replacing a range of registers based on the luminance (brightness) of the colors stored in the registers. Some genlocks offer mechanical controls such as switches or sliders to vary the mix or toggle it on and off. Some offer software control and some offer both. SuperGen from Digital Creations, the Magni 4004, Mitemics' AmiGen, and Commodore's 1300 or 2300 are a few of the Amiga genlocks available. All Amiga genlocks provide encoder capability and most do a good job.

An encoder or a genlock is essential for video work on the Amiga. Just slightly less important is RAM. Trying to create video images on an Amiga with only 512K of memory is like trying to draw with your toes. It can be done, but why? RAM prices have gone sky-high in the last year, but I believe that 1Mb is the minimum amount of memory required for any Amiga, and 2.5 or 3Mb should be considered the real starting point for any serious work. This is more important than buying a hard disk, modem, digitizer, bit pad, or eating in restaurants for the next few months. Consider it a required part

of the investment. You will save, if you value your time, at least the cost of the RAM in reduced frustration and maximal use of software features.

If you are interested in capturing images from television, video tape, photographs, or real life, you need a **digitizer**. There are two basic types. Photodigitizers convert photos and other non-video non-moving images into data the computer can use. Frame grabbers convert video signals into computer data. Frame grabbers can be used with a video camera to convert flat art to computer data, but the Digi-View photodigitizer has been the most popular tool in this area. Digitizers vary in price, performance, and functionality, but the FrameGrabber, Impulse Video Digitizer, Perfect Vision, and the new LIVE! digitizer with Invision software should all be considered for your purposes.

### **Amiga Video Software**

On to software. Buy a paint program. Let me say it again, buy a paint program. This is essential for everything you will do later on. The standard choice for many has been Deluxe Paint II, but this may no longer be the case. You should also take a look at Express Paint 3.0 and Deluxe PhotoLab. Express Paint offers some amazing advanced features, but it is a little more difficult to master. Deluxe PhotoLab has the advantage of offering HAM mode functionality as well as half-brite.

HAM (Hold And Modify) is a pixel color encoding format that displays the Amiga's full 4096-color range in a single image. It uses a large amount of memory and is not compatible with the normal Amiga display modes. Not all programs support HAM mode, but the image results are phenomenal. Half-brite mode doubles the number of colors available in the normal display modes by adding a "half-brite" color to each normal color. This mode is available on all Amiga 500s and 2000s and some 1000s.

If you plan on working exclusively in HAM mode, there are other HAM

paint programs. Digi-Paint, Photon Paint and PrismPlus all offer a varying mix of features and ease of use. You should take a close at each program before making a decision on one.

You will also want a video titling program. These generally have two parts; a text generating and rendering module, plus a transition and display module. You can duplicate some of the features of the first module with a good paint program, but not all. A dedicated titling program will make the creation of drop shadows, strobe effects, rotations, extrusions, edges, squeezes and stretches easy. Some titling programs use special structured fonts that can be sized with no distortion or blocky pixelized look.

The transition and display portion can be a simple slide show program, or it may offer dozens of sophisticated wipes, fades, and other effects. There is a wide range in price, features, functionality, ease of use, and design philosophy. Some titling programs overlap into animation or presentation applications. Titles worth considering include TV \* Text/TV \* Show, Video Titler, ProVideo Plus, and Video Effects 3D.

Programs that overlap into presentation applications include Deluxe Video, Deluxe Productions and The Director. These programs fall into a general category of integration applications. They are used less to create original imagery than to coordinate and display. Each offers a very different user interface so although they can conceptually be grouped together, they are very different in design and capabilities. I've excluded the simple page flipping programs from this category because they offer far less than full-featured presentation applications.

In fact, it's very difficult to pigeon-hole many Amiga applications in a single category. Most presentation applications offer a measure of animation, paint programs provide some image processing, animation programs offer paint functions—there are few clearcut divisions. The groupings I've created for this article

are solely for convenience and should not be viewed as rigid definitions of an application's functionality.

A perfect example of this occurs when I try to categorize animation applications. A list of basic categories might include—2D, 3D, and ray tracing. But where would this fit products like MultiPlane, a digital compositor for layering animations, or Cel Animator for synchronizing sound to animations?

Basic groupings can still be made. 2D animation applications include: Aegis Animator, Fantavision, Zoetrope, Deluxe Video, and The Director. 3D animation applications, some with ray tracing capability, include: Sculpt 3D, Videoscape, Turbo Silver, Animation:Apprentice, Animation:Jr, Forms in Flight, and Sculpt-Animate 4D.

### **Amiga Animating**

A complete explanation of the basics of animation would require another full article, but let's at least outline the concepts. The simplest form of animation might be moving a static object across a static background. This is basic 2D animation. Think of an airplane flying across the sky. Change the airplane into a bird and have the bird flap its wings and you've got the next level. Now have the background pan in the opposite direction from the bird. Another level.

Now have the bird turn so that you get another view of it. This could still be done in a 2D program. Now have the shading on the bird change as it turns. A little harder in 2D but still possible. Now have a shadow cast by the bird. Still possible. Now have 20 birds in the air. You've passed into the 3D zone. Here's why:

In 2D animation the artist (you) must draw everything. Each flap of the wings requires several pictures as does the change in shading. To see another perspective on the bird requires drawing that new perspective. Having the shadow follow the bird requires drawing that as well. As the number of elements go up and the number of unique views of each ele-

ment goes up, the time required to draw or combine drawn elements goes up.

In 3D animation you create a description of each object instead of a drawing. Generally this description is a wire-frame outline of the object along with details of color, texture, and other characteristics. This wire-frame outline is a 3D representation of the object. For something like a bird, the description might contain sub-objects and details of their relationship to the parent object. The wings may be a sub-object, linked to the body but able to have their own additional up/down movements while still following the flight path of the rest of the bird.

After the wire-frame description is complete, and a motion path for it and any sub-objects has been described, other details can be added. A background can be imported or created, light sources can be positioned and described (white or colored, harsh or diffused) and point of view can be set (camera position). The 3D application then renders an image or a set of images compressed as an animation file. All of the motion, shading, perspective and shadows are handled automatically!

The quality of the final images depends on the techniques used by the 3D application to render the images. The most sophisticated technique is called **ray tracing**. This process requires the computer to analyze the path of a ray of light emanating from each light source described in the animation, and reflecting off every point of every object and background in the scene. Since some rays may bounce from object to object, and some rays may become colored by the objects they bounce off, the total number of calculations required to render a single frame becomes tremendous.

To speed up the rendering time of 3D applications, special co-processor boards are available for the Amiga. These take advantage of the added power and higher speed of the 68020 and 68030 microprocessor chips. They also take advantage of the

higher speed afforded by using 32-bit RAM for memory. There are several 020 and 030 boards available for the Amiga. Ronin, CSA, and Commodore each offer products in this category. As in software there are different design philosophies realized in these products and a careful comparison of both price and performance is advised.

Animation and titling may be the two most popular applications for video on the Amiga, but they by no means exhaust the possibilities. Special effects are an important part of the computer/video interaction. There are several broad categories of special effects software for the Amiga. **Image processing** is the most widely known.

A basic definition of image processing is that it is used to improve or modify the appearance of an image, to extract information from an image, to recognize specific elements in an image, and to measure image elements. Image processing can be used to enhance the edges in an image, improve the contrast, apply false coloring to bring out hidden detail in an image or to improve the overall sharpness of an image.

There are several excellent image processing programs for the Amiga. Two of the most popular are Butcher and Pixmate. Deluxe PhotoLab offers some image processing capabilities, and the public domain program FPIC is an excellent introduction to image processing.

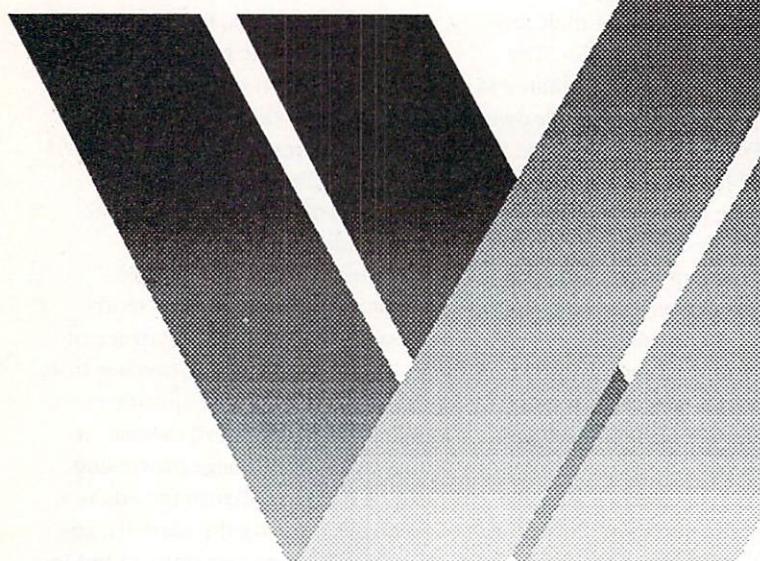
### **"Public Domain" Picks**

As you move ahead in Amiga video animation, never forget that three of the most vital elements are in the "public domain"—your enthusiasm, determination and creativity. Liberal application of these elements to any video project is far more important than your choices of specific products. Good luck in producing some truly amazing Amiga animations. ■

*Matthew Leeds is a prolific Amiga journalist who resides at Corte Madera in Northern California's Marin County. His byline is a familiar sight in just about every Amiga publication.*

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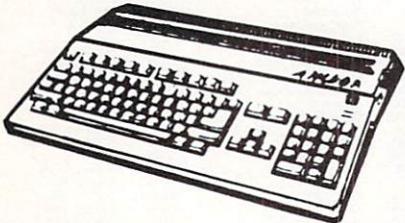
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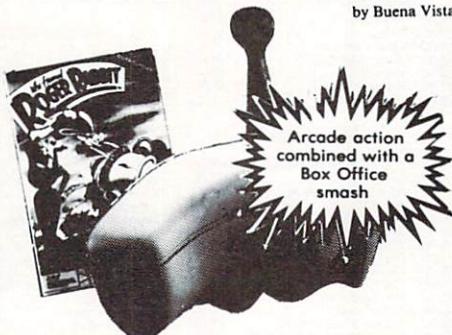
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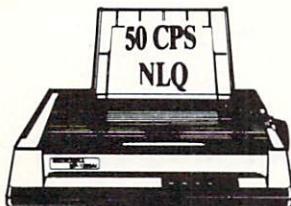
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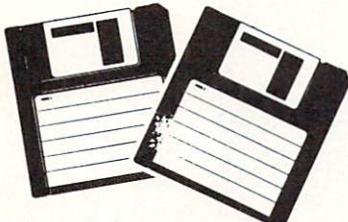
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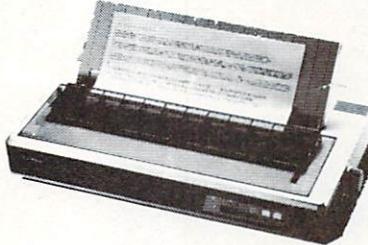
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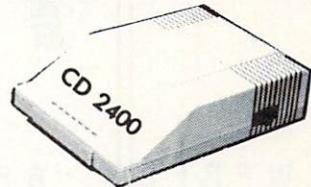
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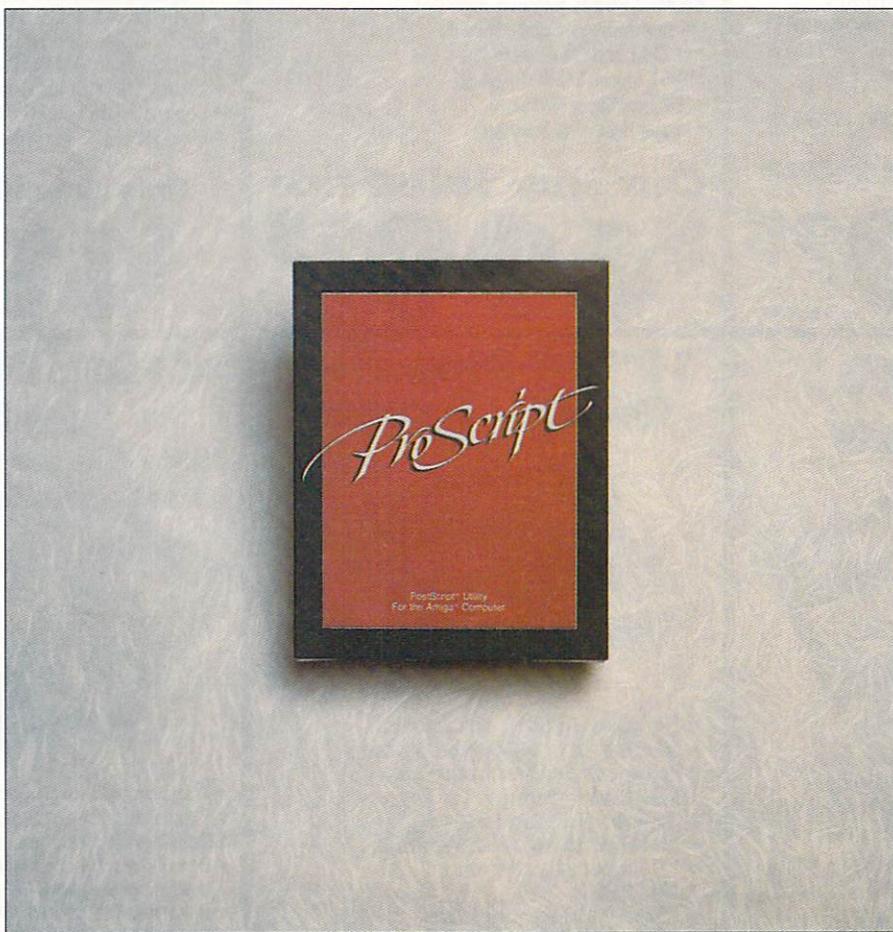
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# ProScript

POWERFUL, AFFORDABLE POSTSCRIPT CAPABILITY

Reviewed by Richard Repas



**ProScript**, from New Horizons Software, enables users of the same company's ProWrite word processor to print documents on PostScript laser printers. **ProSCRIPT** (*We're changing the capitalization during the rest of this review, to cut down confusion between ProScript and PostScript*) can run on a 512K Amiga

single-drive system although two drives are recommended. It multitasks very well and can simultaneously run with ProWrite if your memory configuration permits. It installs easily onto a hard disk without any device assignments or script files. The only requirement is that the associated support files must reside in

the same directory as the program.

For those who enjoy ProWrite's speed and ease of use, but have wished for better-looking output than dot-matrix or letter quality printers provide, there is now another option—PostScript. Those of you who have *not* used ProWrite may now wish to weigh its price vs. per-

formance ratio against the competition. Of the "heavies" in the Amiga word processor market, WordPerfect (costing from \$150-300) offers limited PostScript capabilities and font selection with no graphics support. The other heavy, Excellence! (costing from \$170-300), supports graphics and PostScript. However, Excellence! uses an odd naming convention for fonts, which limits selection to only the four PostScript font families bundled with this software. At half the price, ProWrite (\$70-100) coupled with ProSCRIPT (\$30-50) outperforms them both when it comes to what counts, hardcopy!

If I had to limit this article to one word that best describes the merits of ProSCRIPT, that word would be versatility. New Horizons has managed to provide ProSCRIPT with the ability to easily perform nearly any PostScript printing task one could expect from a word processor. Any user configuration you may wish to set can easily be saved as the default. ProSCRIPT is versatile in its font management and output selection. Its user interface is very intuitive and well thought-out. Even its concept, that of an add-on module illustrates versatility. Creating a stand-alone PostScript print module as a software upgrade is a great idea. With the cost of PostScript laser printers starting around \$4,000, laser output is not for everyone. So New Horizons wisely kept ProWrite's code size and price down by making PostScript output an option.

As expected, ProSCRIPT has an output page setup window in which you can set the software to perform standard PostScript printing tricks such as changing vertical and horizontal magnification, entire page rotation, image reversal and offsetting. The same window has options for six settings of page size (letter through tabloid), as well as portrait or landscape orientation.

In the General Setup window, ProSCRIPT can be configured to send out PostScript either through the Amiga's serial or parallel ports, or through a user-named network de-

vice. In addition, PostScript code can be written out to a disk file—which can then be hand-carried or sent via modem to a desktop publishing service bureau. There, the same PostScript file can work on a 300 dots per inch (dpi) laser printer, or a 2,540 dpi Linotronic L300 laser typesetter. There are also provisions for adjusting halftone screen settings for printing documents with graphic images according to the output resolution.

### No Jaggies

We have all seen the jagged fonts when printing from the Amiga using various paint programs or the Notepad utility. These jagged characters result from the printer enlarging a bitmap to the output page size. Most people assume these jagged edges disappear with laser printing, only to be disappointed by the jaggies being rendered even more sharply in the higher resolution. This is because the letters we see printed from the Amiga are from the bitmap screen fonts. The difference with PostScript fonts is that the font displayed on screen is only a representation of the font the printer will "draw" when printing the page. PostScript fonts were created for the printer device, not the screen. It is only when laser printing software replaces the fonts you see on screen with a corresponding font residing in printer memory that you lose your bitmap jaggies and gain smooth edges.

To this end, ProSCRIPT allows the user to easily choose any PostScript font that it finds a .metric file for in the system FONTS: directory. That means that all fonts used by Gold Disk's Professional Page will work with ProSCRIPT. In fact, any font from Adobe Systems, the originators of PostScript, will work with the software as long as the FONTS: directory contains a metric width file (.metric file) and the PostScript printer has the font definition file available. This versatility may not mean much to most users seeking an occasional laser printout. However, ProSCRIPT does not hamper those

who might wish to work with a desktop publishing service bureau having a large selection of the Adobe font library available.

Although the smoothly rendered curves provided by PostScript fonts are one of the main advantages of laser printing, there may be times when you want to use a decorative, though blocky, screen font. A very nice option built into the software is the ability to choose whether or not to let ProSCRIPT substitute a PostScript font for an Amiga bit-mapped font when printing. ProSCRIPT utilizes a user configurable file to determine which PostScript font to substitute for each Amiga font. This file can be configured with a "wildcard" as well, letting the software substitute for all, or several, fonts. This way, documents created in the past may be printed without reloading into ProWrite in order to reselect fonts.

Although ProSCRIPT is a printing utility that works only with ProWrite document files, the software also comes with a utility that will convert files from other formats. Files created with Textcraft, Scribble and TextPro word processor software easily convert into ProWrite document files. I feel New Horizons could have gone a bit farther with this utility and supported a few other formats. Still, ProWrite has the ability to load ASCII files from other word processing software saved using "text only" options. This makes the ProWrite and ProSCRIPT software combination a very powerful, low cost option for Amiga owners. With the strong graphic layout capabilities of ProWrite word processor, plus paint software, some very respectable entry-level desktop publishing is possible. ■

*Richard Repas does Amiga typesetting in San Francisco at Giraffe-X, where he produced the Polaroid Palette color slides seen in this issue of AMIGA Plus.*

---

**PROSCRIPT** \$49.95

New Horizons Software, 206 Wild Basin Road, Suite 109, Austin, TX 78746.  
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CIRCLE 212 ON READER SERVICE CARD

overcome. Amiga C language programming is more thoroughly documented than is assembly language. The CREATEPORT and DELETEPORT routines are explicitly provided for C programming, but not for assembly. Two general purpose routines are included in this article's program—MAKEAPORT and KILLAPORT. They play the same role that CREATEPORT and DELETEPORT functions (from Amiga.lib) do in a C program. The I/O functions are provided by each device's library of routines. The Exec routines such as DOIO and SENDIO "know" how to access those parts of a device's library of routines.

### **About The Program**

*To correctly use the AMIGA Plus Disk files described below, see the README.ASM instructions on the disk.—THE EDITORS*

Except, the AMIGA Plus Disk software illustrating this article, has a MAIN program with subroutines to do the steps 1-9. There are also some macros which make the programming job easier. The source presents all constants as labels using "equates" (EQU) so no particular assembler or include files are necessary. All labels are resolved in the source. Readers of "Amiga Machine Language Programming Guide" (Compute! Books), which I co-wrote, will recognize the format. These routines and macros (as well as the EQUATES) can be added to the those found in the book. Here's a look at the program's structure. The MAIN program calls three subroutines—OPENPRINTER, PRINTERWRITE and CLOSEPRINTER.

OPENPRINTER first calls MAKEAPORT to accomplish step 1. Then it calls CREATEPRTIO to accomplish steps 2 and 3. OPENPRINTER finishes up with a Exec call to OPENDEVICE to accomplish step 4.

PRINTERWRITE is a very short routine to set up a WRITE command and pointer to the output text in the IOREQUEST table. Then it calls the

Exec routine DOIO. When DOIO is called, everything waits until it returns (until the I/O is finished). This accomplishes steps 5 and 6.

CLOSEPRINTER is a flexible routine to check if the I/O is done. If so, the routine calls CLOSEDEVICE and then KILLAPORT. Finally it frees the memory allocated for the IOREQUEST. If the I/O is not finished then CLOSEPRINTER calls ABORTIO to kill it before closing and freeing resources. Because CLOSEPRINTER has the ability to tell if I/O is done and act accordingly, it does part of the job of step 6 and all of steps 7—9.

You can experiment by changing the DOIO call in PRINTERWRITE to SENDIO. The SENDIO routine does NOT wait until I/O is done. It returns control to the host task immediately. Since CLOSEPRINTER can deal with an unfinished I/O situation, the experiment should work. Using DOIO means the host task will "sleep" until the DOIO routine "hears" the reply message from the device. Using SENDIO means the host task will carry on and leave the device to finish the I/O as a separate task. SENDIO can help make I/O more efficient when simple progress messages to a printer are needed. DOIO should be used when you need to be sure I/O is done before your program goes on. You wouldn't want to use SENDIO to start sending data to a floppy disk and have the program immediately try to read it before the writing is even done. It is also very unwise to free the I/O resources before I/O is finished!

There's plenty more you can learn to do with device-oriented I/O using Exec. The QUICKIO routine forces your I/O request to be "first in line." CHECKIO will tell if I/O is done yet, and ABORTIO can force I/O to stop. Messages and their associated ports can be used more creatively, too. In this month's program we used one message port required for an IOREQUEST, namely as the IOREQUEST's reply port.

You can create several message ports within a program to send and

receive messages from other ongoing tasks. In a program with Intuition windows there's always the IDCMP (Intuition Direct Communication Message Port) which can relay various messages about user input (mouse movement, clicks, etc.). You could create your own message port to receive "signals" and messages from other input events or programs. The AREXX language by William Hawes is based on the message passing concept. With the proper "hooks" (message ports), any program can communicate with any other via Exec messages. AREXX is designed to send messages from a "script" to any AREXX-compatible program. An AREXX-compatible program is simply a program prepared to accept messages from another AREXX-compatible program. With the right combination of message ports you can get a whole bunch of multi-tasking programs to talk to and control one another.

With this introduction to Exec I/O and devices, you can begin to experiment on your own. I hope one hands-on example like ExecPRT will make Exec a little less mysterious and motivate you to study more of the Exec manual. In the next installment of this series I'll present some message-passing examples and hints to exploit more of Exec's sophistication. ■

### **References**

Amiga ROM Kernel Reference Manual: Exec, Libraries and Devices. Addison Wesley

Amiga Programmer's Handbook Volume 1. Sybex

Amiga Machine Language Programming Guide. Compute! Books

Amiga System Programmer's Guide. Abacus

Dr. Dobb's Journal of Software Tools #123, January 1987, pp. 69-80.

*Daniel Wolf, PhD co-wrote one of the first books on Amiga assembly language. He is an Amiga software developer from Santa Maria, on the central California Coast.*

# NEW PRODUCTS

## GFA BASIC 3.0

In a new agreement with GFA Systemtechnik of Germany, Antic Software will be the exclusive distributor of GFA products in the United States and Canada. Antic Software will conduct all marketing, production and product support activities in those territories, and will also distribute GFA products in Australia.

GFA BASIC has long been the most popular BASIC for the Atari ST. Now, Antic will be releasing **GFA BASIC 3.0**, the latest and most powerful implementation of BASIC for the Amiga. Outstanding features include a high-speed interpreter, in-line C and assembler commands, easy access to all Amiga libraries, extensive Amiga commands with sub-menus and built-in file requester, and a run-time module. A compiler and assembler are scheduled for distribution in the second half of 1989.

### GFA BASIC 3.0 \$139.95

Antic Software, 544 Second Street, San Francisco CA 94107. (415) 957-0886.

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In addition to a proprietary cable that converts the high speed interface of the JX-100 for use on the Amiga, ScanLab/100 will come complete with many of the same advanced color processing capabilities already used by ASDG's **Professional ScanLab** (\$995), which includes all software, cables and hardware interfaces

needed for the Amiga 2000 to control the Sharp JX-300 and JX-450 color scanners. With Professional ScanLab, high-quality 24-bit data from the scanner can be converted into Amiga HAM images, or maintained in its 24-bit true color form. According to ASDG President Perry Kivolkowitz, "It's now possible to generate truly professional color separations for magazine publishing and advertising using Professional ScanLab, the Sharp JX-450 (or JX-300) and an Amiga 2000 as an input system."

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KFS has brought out version 1.2 of **THE ACCOUNTANT** software. The original version of this full-range accounting system for medium or small businesses included such features as integrated Sales, Expenses, Receivables, Payables, Inventory, Payroll and General Ledger. Version 1.2 enhancements include a fully integrated 5,000-item inventory, cash register, faster sorts, batch report printing and the new Workbench 1.3 printer drivers. For a complete cash register, THE ACCOUNTANT uses the MMF Industries ECD-200 Cash Drawer and Star DP6840 Receipt Printer (available as a package set from KFS Software for \$699.95.)

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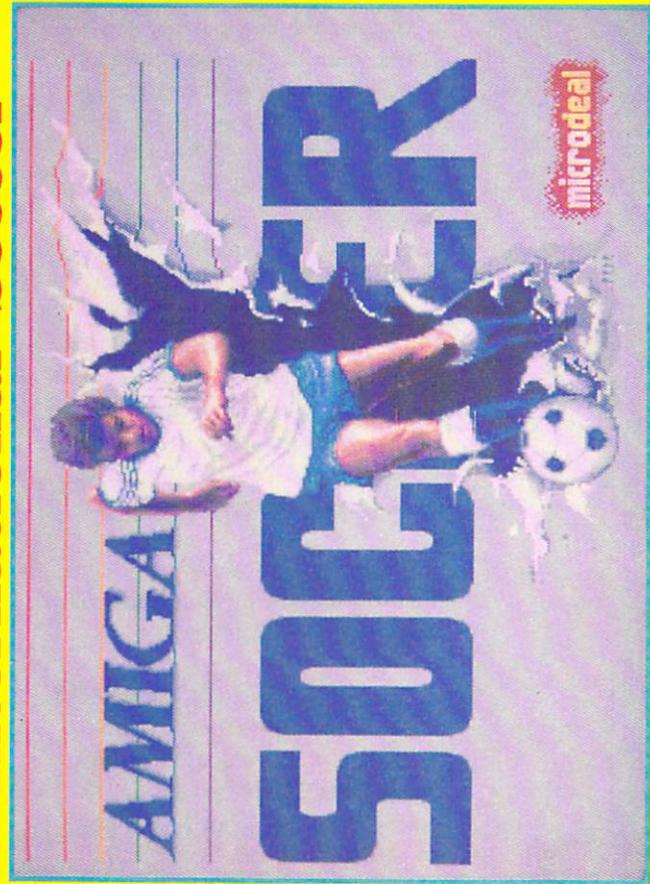


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### Amiga Computing, October 1988

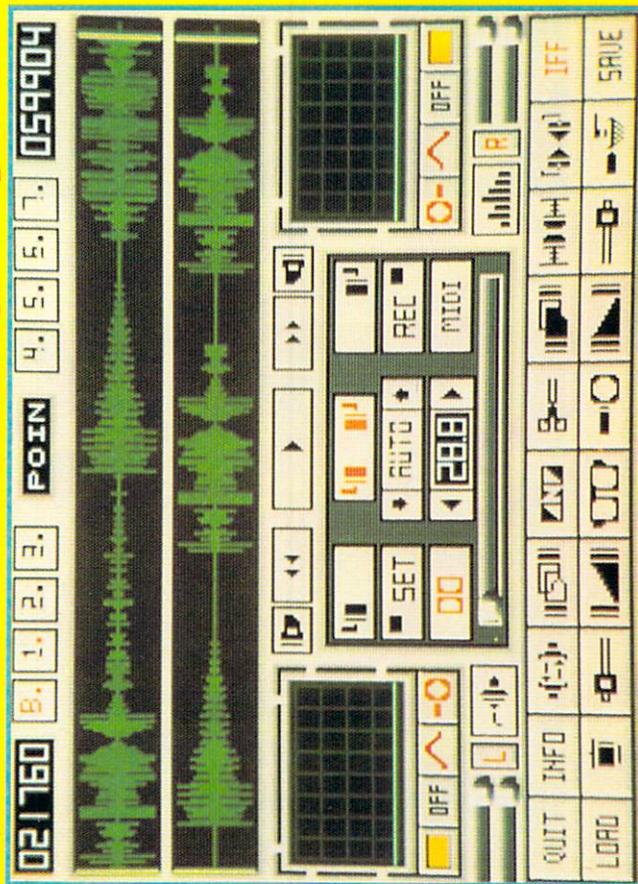
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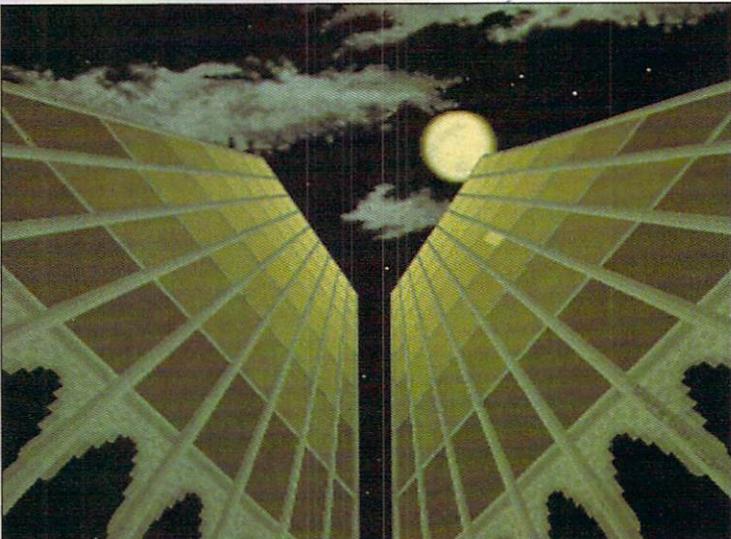
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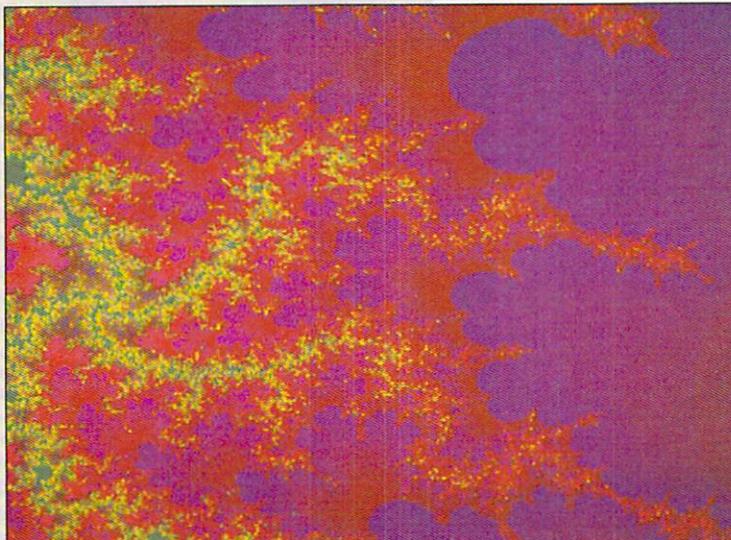
# READER ART GALLERY



Ant Image



Nightshift



Mandel

**E**very issue of *AMIGA Plus* will feature a gallery of reader graphics.

We pay \$50 for each image published in this section. You are invited to mail disks of your best works to: Reader Art Gallery, *AMIGA Plus*, 544 Second Street, San Francisco, CA 94107. Single pictures or short animations are both eligible for consideration. Graphics files from the Gallery will be included on the *AMIGA Plus* disk, as space permits.

Images published in the Reader Art Gallery must be the original creations of the artist, produced on an Amiga computer. Digitizations of other persons' works are not eligible. Gallery submission disks will not be returned, unless you include a stamped, self-addressed mailer. On each *disk label*, please *legibly* print your name, address and phone number. And enclose a short letter listing your filenames, the title of the graphics software you used, and any other relevant technical information. If a specialized "show" program is needed for viewing your pictures, please include it on the disk.

The pictures Ant Image and Nightshift were created by Amiga artist Gary Dominguez of Oklahoma City, OK.

Mandel was created by Daniel Wolf with his own HAMandel program. HAMandel will produce Mandelbrot and Julia set HAM+ pictures in 256 colors. It is available for \$39.95 from: MegageM, 1903 Adria, Santa Maria, CA 93454. (805) 349-1104.

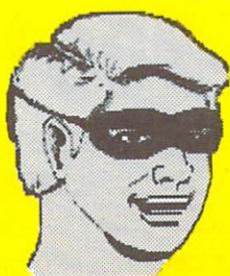
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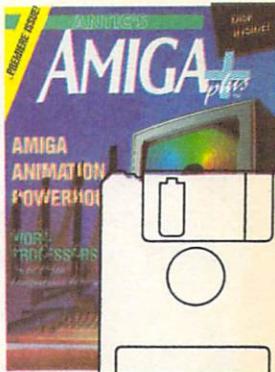
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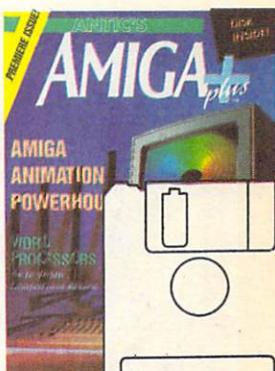
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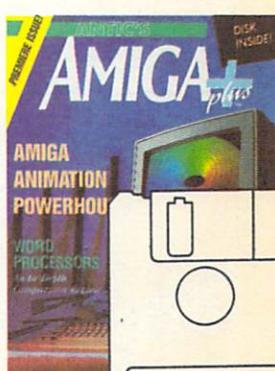
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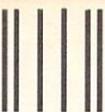
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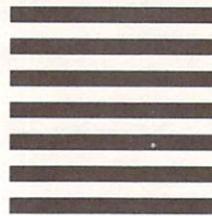


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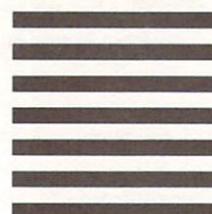
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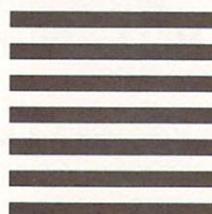
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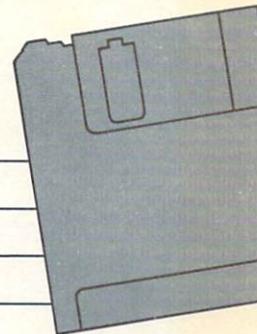
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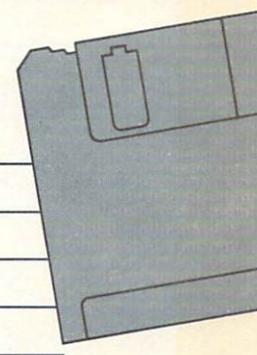
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# AMIGA PLUS PRODUCT INFORMATION

### FOR PRODUCT INFORMATION

**A. What Amiga equipment do you own?**

- 1.  Amiga 1000
- 9.  Extra floppy disk
- 2.  Amiga 500
- 10.  Hard disk
- 3.  Amiga 2000
- 11.  Printer
- 4.  1 meg memory
- 12.  Synthesizer/MIDI
- 5.  512K memory
- 13.  Genlock
- 6.  Over 1 meg
- 14.  Video digitizer
- 7.  3rd-party monitor
- 15.  Video board
- 8.  Modem
- 16.  Bridgeboard

**B. How much do you plan to spend on software over the next 6 months?**

- 1.  \$1-29.95
- 5.  \$100-149.95
- 2.  \$30-59.95
- 6.  \$150-199
- 3.  \$60-79.95
- 7.  \$200-300
- 4.  \$80-99.95
- 8.  Over \$300

**C. What are the three main uses of your Amiga?**

- 1.  Word Processing
- 6.  Desktop Publishing
- 2.  Education
- 7.  Databases
- 3.  Games/ Recreation
- 8.  On-line
- 4.  Spreadsheets/Business
- 9.  Graphics/CAD
- 5.  Programming
- 10.  Music/MIDI

**D. What do you plan to buy in the next 6 months?**

- 1.  Printer (Dot-Matrix)
- 7.  Synthesizer/MIDI
- 2.  Modem
- 8.  Video digitizer
- 3.  Monitor
- 9.  Laser printer
- 4.  Extra floppy drive
- 10.  Color printer
- 5.  Hard disk
- 11.  Genlock
- 6.  Memory upgrade
- 12.  New Amiga computer

**E. Household Income?**

- 1.  Less than \$25,000
- 4.  \$50,000-74,999
- 2.  \$25,000-34,999
- 5.  \$75,000-99,999
- 3.  \$35,000-49,999
- 6.  Over \$100,000

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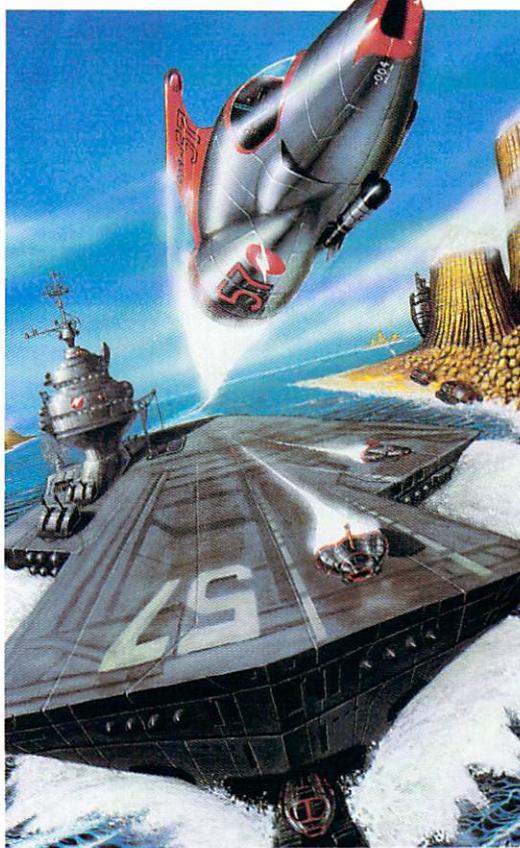
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